THE

TROPICAL AGRICULTURIST

AND

MAGAZINE OF THE

CEYLON AGRICULTURAL SOCIETY.

VOL. XXXIX, COLOMBO, DECEMBER 15TH, 1912, No. 6.

VILLAGE INDUSTRIES.

PADDY AND PARA.

In the last issue of the *Tropical Agriculturist* Mr. Wickramaratna drew attention to the enormous fortunes that are being made from rubber planting. Comparing the profit from an acre of land under Paddy with that of an acre under Para the calculations work out at about 700 per cent. in favour of rubber. There are no doubt many reasons of a domestic character which prohibit the native land-owner from abandoning the cultivation of Paddy and with these we have no concern, it being our business, that is the business of the Ceylon Agricultural Society, to draw the attention of members to circumstances which may enable them to make two blades of grass grow where only one grows now. That, indeed, is the object of Scientific Agriculture. If it will not stand such a test, a system, no matter how learnedly elaborated, cannot claim to be scientific.

We suppose the fact will not be disputed that large areas of paddy land in the rubber zone could be drained and put under Para, and that when the trees come into bearing profits might be expected to be very much greater than they were with paddy. At the same time the labour would certainly be much less arduous.

Apart from domestic considerations to which we have referred, the two difficulties in the way are, as indicated by our correspondent:

(1) The possession of land by more than one owner and the difficulty of getting all to agree to any new departure from existing customs.

(2) The lack of capital on the part of the villager to keep himself and his family provided with food and other necessaries of life and to cultivate and maintain his rubber land for five or six years until it begins to yield a return.

As to the first, much would depend upon whether one owner could be found possessing the necessary interest and influence to induce his fellow owners to fall into line with him; and in very many cases it is probable that some would arise to give a lead. The second difficulty, namely,

a lack of capital, is more serious, but small cultivators in other countries have surmounted similar difficulties and, if the Ceylon villagers set themselves to the task, they no doubt could do the same. The Cocoa industry of the Gold Coast which has arisen during the last 30 years and is now the largest in the world, is entirely in the hands of small land-owners ; and the Clove industry of Zanzibar, also the largest in the world, very considerably so. In this age of co-operation and combination nothing is impossible even to the humblest and poorest peasant and it is along these lines that the problem will have to be approached. The methods of the natives of the Amazon now being demonstrated automatically at Peradeniya, if adopted by the villager in their crude but effective form, would supply the means of manufacture without any other apparatus than a mud oven, a specimen of which will also be at work at Peradeniya in a few weeks' time. It should be remembered that the tapping and manufacture of Para rubber was in the first place, and still is, a peasant industry.

Ceylon has lagged behind in the matter of co-operation but a beginning is being made. We draw the attention of our readers to an account of the Co-operative Credit Societies in India and the wonderful progress that has been made there within recent years. The movement is spreading in Burma, Mauritius and the Islands of the Pacific and it is time for Ceylon to wake up.

In addition to increased profits and less arduous labour by converting paddy fields into rubber plantations, the drainage of the swamps would have a very beneficial effect upon the health of the people, there can be very little doubt; as the paddy fields in the "off" season are full of anopheles mosquitos which breed in the water pockets formed by the trampling feet of the buffalo grazing down the stubble.

CEYLON PRODUCTS IN AMERICA.

THE PHILADELPHIA MUSEUM.

The following is a copy of a letter received by the Director of Agriculture, Peradeniya, from Mr. W. P. Wilson, Director of the Commercial Museum, Philadelphia :—

October 30, 1912.

The Director, Royal Botanic Gardens, Peradeniya, Ceylon.

DEAR SIR,

I want to express my high appreciation of a donation recently received by this Museum through Mr. F. Crosbie Roles, Commissioner for the Government of Ceylon to the Third International Rubber and Allied Trades Exhibition, held in New York, September 23rd to October 3rd, 1912.

We received a trunk of a rubber tree, showing scars of tapping and a bottle of rubber milk which we have added to our Ceylon exhibit.

It will probably interest you to know that this museum has on permanent exhibition the best series of Ceylon's commercial products which can be seen in America.

Very truly yours,

W. P. WILSON,

Director.

THE MANUFACTURE OF TANNIN FROM MANGROVE.

The *Indian Forest Records* of July has an interesting article on the above subject by Mr. PURAN SINGH, F.C.S.

He states that raw material is fairly abundant in Tavoy, Mergui and Andaman Isles. If the mangrove forests are worked in scientific manner, the supply may be said to be almost inexhaustible. The current market rate of mangrove bark which is also generally used by Burmese tanners, is about Rs. 22 per ton at Rangoon. Its cost at Mergui is Rs. 15 per ton, the freight from Mergui to Rangoon being Rs. 5 per ton. But the price of mangrove bark is liable to considerable reduction if regular and large supplies are contracted for, or if the collection is methodically undertaken by the manufacturer direct. The wholesale cost at Mergui is Rs. 15 per ton, and it stands to reason that at this rate the dealer must be making some profit after allowing for transport of the bark from the forest to the market. Though exact figures at which the bark can be extracted are not known, the total cost of the collection of bark per ton by direct agency may be safely placed at not more than Rs. 10 per ton, which would work out to about Rs. 15 per ton delivered at a factory near Rangoon. Besides, it has been noticed that the bark merchant sells his dry and fresh bark at the same rates. Hence a further reduction seems possible were the manufacturer to have his own drying sheds in the forests and were the material to be air-dried before shipping. Taking the moisture of fresh bark to be 50 per cent., the cost of the freight per ton is reduced at once by half and the total cost is thus reduced from Rs. 15 to Rs. 12·50 per ton delivered in the vicinity of Rangoon.

If the bark is to be purchased in the open market it must be done on its percentage contents of tannin and moisture. Mangrove barks vary much in quality, and it would be unbusiness-like to pay for good as well as for bad barks at the same rate. The price of air-dried bark containing about 30 per cent. of tanin with a moisture content of 10 per cent. say, might be fixed at the maximum of Rs. 20 per ton delivered at the factory.

Yield of Extract per 100 Parts of Bark.

It has already been shown that mangrove barks of good quality should at least yield 50 per cent. of solid extract containing 20 per cent. of moisture. For purposes of estimate, however, the ratio of bark to extract is taken at 2·6 : 1 instead of 2 : 1, thus allowing for the variation in the quality of the bark.

Mangrove barks when air-dried, containing 8 to 10 per cent. of moisture, yield 50 per cent. of extract, containing 20 per cent. of moisture.

A lower yield than this shows that either leaching is not thoroughly done or the quality of the bark is below the standard.

From fresh bark containing 40 per cent. of moisture, the yield of the extract with 20 per cent. water will be $\frac{1}{3}$ of the total quantity of the bark used.

The total outlay of a tannin factory capable of dealing with 20 tons of bark or tan woods in 24 hours is estimated at Rs. 286,500.

THINNING-OUT HEVEA ESTATES.

Opinions of two Ceylon Planters.

The India Rubber Journal publishes the opinions of two leading planters of Ceylon on the subject of thinning-out of Hevea plantations.

MR. W. NEWBURGH TISDALL says:—

"I believe the best number of permanent trees per acre to be 100 or less on flat land; on steep land this might be modified, and up to 150 may not be too many.

2. My own ideas just now are as follows:

Clearings planted 10 ft. by 10 ft. I would first cut out alternate rows complete, and later on alternate trees, making 20 ft. by 20 ft.

12 ft. by 12 ft. I would treat in the same way at first, only cutting out alternate trees if found necessary.

20 ft. by 10 ft. Cut out alternate trees.

15 ft. by 15 ft. and 17 ft. by 17 ft. I think might be treated differently, and alternate trees in alternate rows cut out for a commencement.

I have been thinning-out on various estates, but only so far on very closely planted fields. I found after about three months, where a 10 ft. by 10 ft. field had alternate rows removed, that the foliage of the remaining rows had closed overhead, leaving matters as regards light almost as bad as before.

3. I believe it would be better to remove the tree, root and branch, at once if labour permits, as if it is necessary to thin out at all it should be done properly. Of course a certain quantity of latex can be obtained from the stump after it is pollarded, but I consider that root development is as great a necessity as light and air.

After experiment on a certain estate in South India I decided on this course over a field of 242 acres, as it was found where the trees were only pollarded that the other trees did not increase in yield, but where they were removed *altogether* the other rows showed a decided increase, but nothing appreciable until about six months, when the roots doubtless had time to develop; if this experiment can be relied upon, there is no doubt that it is better to remove the stump as soon as possible.

At the same time I believe that *annual* doses of a suitable manure will obviate the necessity of cutting out for some time longer.

The chief danger in not thinning-out is disease, which I regret to say has forced itself upon our notice recently.

I daresay the following opinion will also interest you. It comes from an experienced planter in this district whom you know quite well:—

1. 100 trees per acre.

2. Every alternate row if growth fairly even, otherwise backward trees only.

3. Where thinning-out is to be done the trees should be lopped at once and followed by uprooting as labour and conditions prevail. The lopped trees may be tapped in the ordinary way until removed."

Mr. G. H. Golledge of Gikiyanakande, Neboda states :—

"Thinning-out is claiming the attention of rubber planters and others.

Experiments are being carried out on some estates with a view to determining the various points raised. Considerable time, however, must elapse before any very definite data are available.

It may be taken for granted that immediately after thinning-out the remaining trees will girth much quicker ; but it is impossible to say how long it will be found necessary to wait before the thinned-out areas will equal the closer planted as regards yield per acre.

Bearing in mind that it should be our chief endeavour to obtain a maximum yield from each acre, having due and full regard to the permanent health of the trees, and the importance of cultivation, it seems to me the question resolves itself into what number of trees a well cultivated acre of land will carry and return a crop of say 500 to 600 lb. dry rubber per annum.

In view of the immense benefits to be derived from cultivation it is very questionable if the solution will be found in wide planting.

In the light of present knowledge I would rather have 200 than 100 trees per acre, and if I were opening now I think it would be 16 by 16 (150-170 trees) or 15 by 15 (180-190 trees).

Given a fairly free soil and good cultivation, climatic conditions being favourable, I would fear nothing we know of at present in the way of pests, so far as Ceylon is concerned.

With regard to bark renewal, my feeling is that what cultivation will not do wide planting will not either.

Of course local conditions have to be considered too, and if the climate were always more or less damp (having in mind the canker disease) it would be necessary to consider wider planting.

In thinning-out there is some doubt, I think, as to whether the trees will ever be what they might have been had they been originally widely planted, either as regards girth, appearance or yielding powers.

Then supposing an estate to have been widely planted originally, and tapped from say fourth to fifth year, would it be reasonable to expect the much greater yields per tree in the tenth-twelfth years and onward ?

To sum up, I think the question of thinning-out is one that should not be rushed in any way.

I have seen very satisfactory and very promising results from cultivation, and eliminating all sickly trees which should be removed, it would be wise perhaps to see what cultivation will do for the remainder, pending some reliable data to work on.

I have been asked more than once, "What about your 5th-6th renewal" —I multiply by three years (the lowest period for good renewal), and find 15 and 18 years.—Answer, " Sorry none."

Has the rapid paring away of many renewed layers of bark anything to do with the present tendency to seize on close planting as the direct cause of thin renewal ?

In answer to your second and third questions, having decided to thin-out, I should first of all remove all sickly trees and any others which from various causes do not look promising. I should then deal with the remainder to be removed as evenly as possible, the object in view being to give each remaining tree a fair division of soil. I should remove the doomed trees *at once*, with as much of their roots as possible.

It is by no means uncommon to find two very good trees in one hole equal in every way to the best trees round about. I see no reason why this method of planting in a slightly modified form should not be successfully adopted, and I propose trying it."

CEYLON GOOSEBERRY.

(Illustrated.)

The tree to which the writer gave the name "Ceylon Gooseberry" some years ago, first in a Departmental Circular on tropical fruits, deserves the attention of fruit growers in the tropics, for few fruits in a wild state appear to offer more promise of improvement by systematic selection and high cultivation. It is a small shrubby tree with ovate, alternate leaves belonging to the family *Bixaceæ* and known to botanists as *Aberia Gardneri*, being named after Mr. Gardner who was Superintendent of Peradeniya from 1844 to 1849. To the natives the tree is known as "Ket-embilla" and an interesting fact in connection with it is that it is endemic in Ceylon, that is having its native habitat confined to this country. The round and slightly velvety berries are somewhat of the size, form and consistency of gooseberries, being purplish in colour when ripe. They have a pleasant sub-acid taste and make excellent jam or preserves. The tree thrives best at medium elevations and likes rich humous soil and good drainage. It is readily propagated from seed which, being small, should be sown in pots under cover, using fine sandy soil. The fruit is in season usually in September.

H. F. MACMILLAN.

KIND TREAMENT OF COWS.

An interesting experiment was recently performed at the Kansas Agricultural College to determine the relative results of kind and unkind treatment upon cows, says the *Queensland Agricultural Journal.* Three cows were treated kindly, and were found to give an average of 36 lb. of milk, with 4·3 per cent. of butter fat. Later, these same cows were frightened by jumping at them, howling at them and striking them while they were eating. It was found at milking that they produced only 23 lb. of milk, containing 3·4 per cent. of butter fat. Three other cows tested gave 31 lb. of milk containing 4·2 per cent. of butter fat under kind treatment. They were driven into a field and the dogs were allowed to bark at them and chase them. As a result they averaged only 23 lb. of milk with 3·6 per cent. of butter fat. It should not be necessary to point the moral.

Photo by H. F. Macmillan.

"CEYLON GOOSEBERRY."
ABERIA GARDNERI.

CEYLON MANGOES.

The *Tropical Agriculturist* Supplement for November describes on page 407 a mango with only the trace of a seed as occurring in Hawaii.

It may be mentioned that a similar mango has been long known in Ceylon, and is called in the vernacular *puhu-amba*.

The tree is not common, no doubt owing to difficulty of propagation, as budding and grafting is unknown among the Sinhalese, and such trees as exist are practically a monopoly of the families that have given us our Maha Mudaliyars. On this account probably the mango has come to be known as the "Maha Mudaliyar" mango.

The Ceylon fruit, unlike the Hawaiian one, is comparatively small but is deliciously sweet. It is almost unknown in the market.

In the Pasdum Korale is a famous old tree which is the property of the Perera family whose head was the Maha Mudaliyar before the present chieftain's father. No land goes with the tree, only the produce being claimed.

The present Maha Mudaliyar, Sir Solomon Dias Bandaranaike, owns more than one tree: and grafted trees are also to be found on the properties of the late Dr. William Dias Bandaranayake who, after his retirement from the medical service, became an enthusiastic agriculturist.

Through the kindness of the owners of these trees the Secretary of the Ceylon Agricultural Society has arranged to raise plants by approach-grafting for the benefit of members.

There are some excellent mangoes in Ceylon, but they are seldom or never found in the market. The best of these are special strains of the "Jaffna," "Rupee" and "Parrot" mango. The mangoes offered for sale rarely include the proper "jat" of these varieties.

Again, take the mango as found in the Jaffna Peninsula. The climate and soil have produced about a dozen varieties quite different from anything found in the wetter parts of the Island. Curiously enough, what is called the "Jaffna" mango in Colombo is known as the "Colombo" mango in Jaffna; but the "Colombo" mango of Jaffna is much superior in flavour to the "Jaffna" mango of Colombo. Another excellent Northern variety —the commonest—is the "Chempadi."

Grafting is to some extent practised in Jaffna and grafted plants of the best mangoes of the North can be secured by arrangement, but they cost more than plants imported from India where grafting is very extensively practised.

Strange to say, there has been no anxiety on the part of members of the Society to secure grafted plants of mangoes from the North, though a supply was specially secured by the Secretary. They either dislike paying Rs. 3 for a Ceylon plant when they can get an Indian plant for Rs. 1·50, or, like many people, prefer an imported article to a locally produced one—irrespective of their real merits.

PROBLEMS OF HEVEA.

The effect of Manure.

The India-Rubber Journal of October 19, 1912, states it has been argued that *Hevea Brasiliensis* is such a hardy tree and greedy feeder that it will flourish even among rocks, and expenditure on manuring need not therefore be considered. Hill-sides, flat plains, drains, swamps, volcanic soils, gravelly and stony terraces and other types of land appear to provide sufficient nutrition for the rapid and continuous growth of Hevea trees.

A very instructive lesson can be learnt from the experience of planters dealing with other products in countries where rubber trees are also grown. Probably the best example is furnished by the tea-planting industry in India, Ceylon and Java. There are many estates which have raised their output per acre, per annum, from 300 to over 600 lbs. by the application of manures at regular intervals. It may, quite reasonably, be argued that the results obtainable with a leaf product such as tea are no guide to those which might accrue from the same treatment of rubber. But it can be shown that manuring has a beneficial effect not only on leaf, but on fruits and bark products. The effect of manures on fruit crops —coconuts, cacao, coffee—is not always so obvious as in the case of tea, but it is now common knowledge that judicious manuring does increase the crop, and in many instances is absolutely necessary.

Effect on Forest Vegetation.

Unlike tea, coconuts, coffee and even cacao, rubber plants grow into trees of enormous size and themselves form a dense forest. The soil under forest vegetation of any type improves in mechanical and chemical composition with age, owing to the protection which the trees afford to the soil, to the action of the roots and the accumulation of leaf-mould. The annual fall of leaf from Hevea rubber trees ultimately effects an improvement in the soil in which the trees are being grown. This is borne out by the analyses of the soils at Heneratgoda, the results proving that the organic matter, potash and nitrogen, are greater in the soil which has been under rubber for twenty-nine years than that maintained under pasture; the lime and magnesia have decreased under the old rubber, while the phosphoric acid is the same under both conditions.

But these improvements do not justify any proprietor in declining to assist nature and to supply still more food to the growing tapped trees.

Relation of Latex to Bark.

Where the soil is naturally very rich, it is granted that the turning over of the soil by forking or chankolling will have as great an effect as the actual application of manures on other soils.

In tillage operations several points have to be borne in mind. In the first case it must be remembered that the destruction of Hevea roots may increase the amount of dead organic matter in contact with living roots, and therefore considerably increase the risks from diseases in this and other ways. It is quite clear that if root destruction is unavoidable the roots must be cleanly cut and not torn; the depth to which different soils need tilling will determine whether that operation can be best done by forking or chankolling.

The application of manures to rubber trees is followed by a more rapid growth of all parts of the plant, the bark included. Now the "bark is the mother of rubber." The greater the weight of bark the larger the number of latex tubes, and therefore the greater the weight of rubber.* You cannot have the bark of healthy *Hevea Brasiliensis, Manihot Glaziovii, Castilloa elastica, Ficus elastica* or *Funtumia elastica* trees without latex. Latex is present in the bark of healthy trees and if removed from any particular part it soon accumulates until approximately the old equilibrium is re-established in the affected area. If more bark is formed as the result of manuring, it will assuredly become filled with latex like the renewed bark which takes the place of that removed during paring operations.

Need of Experiments.

It being taken for granted that manuring does stimulate the growth of the plant and that a total increase in plant tissues means an increase in the rubber content, it now remains to prove that an increased rate of growth is desirable. It is asserted by many that there is a maximum rate of growth in all plants which it is not desirable to exceed. It is common knowledge that manures can "force" plants and that the resulting specimens may be really weak and unable to stand well against the ordinary variations of environment or the attacks of pests and diseases.

Viewing the rubber planting industry in its widest sense, there is no doubt as to the necessity of manuring and tillage. Estates have been planted on poor soil, at high altitude and in uncongenial climates; others have been planted at close distances and after thinning out the remaining trees present a backward appearance. Numerous estates are not able to tap the renewed bark because it has not grown so rapidly as was expected, and monkey tapping, V tapping on restricted areas and other methods have been resorted to. There would be no difficulty in quoting a large number of estates possessing trees which badly require either a good rest or extra food to stimulate the rate of growth.

Those proprietors who admit the necessity of manure are sometimes sorely perplexed because there is very little information of a reliable character respecting the components and quantities of the different ingredients which should be applied. It is true that experiments have been made in Hawaii, Sumatra, Ceylon, and Malaya, but in no case can we confidently accept the results for general guidance.

DRESSING OF PRUNING CUTS.

Mr. W. CRADWICK writing to the *Journal of the Jamaica Agricultural Society* on the tarring of wounds when pruning trees, observes that the operation is often looked upon as the most simple one connected with the art of pruning and is usually relegated to a boy or the most careless and ignorant of a band of pruners. Tar is often plastered on to such an extent that it runs from the wound tarred, down the stem of the tree to the ground, wasting the tar and in the case of young trees doing them considerable harm. Tarring of wounds should be done by experienced men only. To tar a wound avoid fancy experiments and troublesome mixtures. Rub a little coal tar thoroughly into a wound so that even the most minute crack will be filled up, the thinnest form of tar being applied. If the tar is hot so much the better but this is not absolutely necessary, though it should be rubbed in hard. The best brush is a piece of the half-dry coconut husk.

* We believe this has not yet been demonstrated. ED. *T.A.*

THE GARDEN OF EDEN.

Somewhere in Arabia.

The Geographical Journal for August, 1912, reports a lecture delivered by Sir William Willcocks, K.C.M.G., before the Royal Geographical Society on June 10, 1912. Lecturing in November, 1909, in this hall, on "Mesopotamia, past, present and future," he said:—I placed the Garden of Eden of our Bible on the upper Euphrates beween Anah and Hit. Heie must have been thefirst civilized settlement of the Semites, the ancestors of the children of Israel, as they moved down from the north-west. And it may interest some to know that in the latitude of this region, not far from Damascus, wild wheat plants have within recent years been discovered. The wearing down of the cataracts deprived the settlers of the waters of the friendly river which had watered their garden, and they travelled eastwards and could see behind them nothing but the bitumen springs on the east of Eden, which seemed to them like flaming swords in the hands of the offended seraphim. Like all early peoples they called themselves the sons of men who had already conquered the Tigris-Euphrates delta, and among whom had settled those of their sons whose hands were stained with blood and who could no longer be permitted to reside in the tents of their tribe.

As these people understood nature, the river by itself could not begin life until its waters had mingled with those of the sea, and from their union under the action of the flux and reflux of the tides sprung the marshes where life began on earth. As a matter of fact, salt water never reaches the marshes owing to the delta of the Karan lying between them and the sea.

The effect of the 10-foot tide in the gulf is communicated to the rivers, and travels up nearly 100 miles, but no salt water gets into the marshes. To the writers of these very early epics the Deep was a fresh-water deep.

With translations of the Babylonian tablets of creation in my hand, and the plans and levels of the country before me, I have endeavoured, on the spot, to give local colour to the passages describing the Garden of Eden of Sumer and Akkad. After some thousands of yeais, the Euphrates in these reaches is again traversing wide marshes. For some 70 miles in length the river has left its old channel and, flowing over a flat plain some 12 miles wide, is covering it with 2 or 3 feet of water. I have seen Arabs taking reeds and earth and throwing up well-protected banks in the time of low supply and so enclosing areas of land for cultivation and habitation, which will be safe from the attacks of the Euphrates.

The Virile Babylonian

When human beings first appeared on the earth and for many a generation afterwards, men could only have just held their own against wild animals and, while their dwelling-places were surrounded by forests and jungles, the unending struggle must have left them but little time to make any real advance in civilization. It was far different in oases of Arabia and practical oases like Anah and Hit on the upper Euphrates. Here it was possible for men to destroy the existing wild beasts and as their numbers could not be recruited out of the deserts, they were exterminated; and men had leisure to become

gradually civilized. "Amalek was the first of the nations" was spoken with knowledge of the Arabs stretching from the delta of the Nile to the upper Euphrates. Living in tents and using gourds for vessels, they have left no traces such as we see in Egypt and Babylonia; but Arabia has been able to pour forth from her parched loins her virile sons who began the subjugation of both the Nile valley and the valley of the Euphrates. Everything in Egypt was easy and to hand; the Nile was and is the most stately and majestic of rivers and carrying a moderate amount of deposit creates no serious difficulties for the dwellers on its banks; the Garden of the Lord, the land of Egypt, is very fertile; and the climate is mild in winter and never parches in summer. Egypt, therefore, produced no world ideas. None of her sons were possessed of a fine frenzy with eyes glancing from heaven to earth and earth to heaven. It was far different with Babylonia. The Tigris and Euphrates in flood are raging torrents and their ungoverned and turbid waters need curbing with no ordinary bridle. Babylonia's soil is very fertile, but the winters are severe indeed and the summers savage and prolonged. The range of temperature is between 20° and 120° in the shade. Brought up in a hard school they possessed virile intellects. Moses' first contact with Babylonian beliefs and creations in the house of the priest of Midian on the slopes of Horeb, entranced him; in the burning bush of the deserts he saw the footsteps of the Almighty, while heavenly voices spoke to him out of the storms raging on the summit of Sinai. In connection with this we must remember that Moses' wife is called, in one place, a daughter of the priest of Midian, and in another a Cushite or Babylonian woman. Her father was probably a learned Babylonian exercising priestly functions among the Arabs.

The extraordinary dry heat of the summer, by day and by night, gives a lustre to the stars, a distinctness to the constellations, and a glow to the fields of powdered stars (called here the milky way) which cannot be conceived by one who has not spent the whole summer in the plains of Shinar. The sons of Sumer and Akkad were the first astronomers and thinkers of the world. They divided the year into months, the months into weeks and the weeks into days, on a system which lasted to the days of Julius Cæsar. They created the sabbath day, peopled heaven with Cherubim and Seraphim, and they first saw Orion leading out the starry hosts of heaven. Perennial irrigation was their creation and that in the face of floods such as the Tigris and Euphrates bring down. By their skill they introduced wheat on the Earth, but in the domain of abstract thought they were especially predominant. In evolution they out-Darwined Darwin.

Seeing the delta of the rivers which had been at the mercy of the high floods, gradually reclaimed, and steady progress on every side of them, they cast their thoughts back and saw as the beginning and origin of everything, infinite chaos represented by the devastating spirit of the floods of the river mingling with the wasteful spirit of the sea and producing monstrous births; but less monstrous than themselves. Tiamat, through her union with Apsu, gave birth to Lakhmu and Lakhamu, and ages increased, adn Ansar and Kisar were born. Long were the days and indifferent gods came into existence; then long intervals of time elapsed and the good gods were evolved, each better than those who gave them birth, until finally Marduk appeared, the greatest and most beneficent of all.

Site of the Garden.

Now, where was the original home of these interesting people, to whom we all owe so much? For reasons already given, it must have been in some country of oases surrounded by deserts, and Arabia is such a country, and at their very doors. The oases of Arabia are close at hand to both the Nile and the Euphrates and the natural overflow of the surplus population would be Egypt and Babylonia.

Every part of the Euphrates delta, from Hit to the Persian gulf, has at some time or another been called "Eden," the irrigated and cultivated plain, as distinct from "Kura," the unirrigable hill or plain. So in Egypt to-day the "reef" is the irrigated plain and everything else is the "jebel," the desert where there is no rain and hill or mountain where there is rain. Soil and climate are eminently suited to fruit gardening. From date palms and oranges to peaches and plums every fruit tree is at home. The date palm is really the indigenous tree of the country. "Put its feet in water and its head in hell and it will do all the rest" is the saying of the people.

AGRICULTURAL CO-OPERATION IN ENGLAND.

Referring to the Agricultural Organization Society, the *London Times* of November 1 says that in order to qualify for grants from the Development Fund, the Society has now been reconstituted to meet certain conditions laid down by the Board of Agriculture and Fisheries and the Development Commission.

Under the conditions the work of agricultural organization on co-operative lines is to be continued on a more comprehensive scale. The first governors, who hold office until April 1914, have been appointed by the Board of Agriculture and the Development Commission jointly and in addition to representatives of the old society's governing body, include representatives of important agricultural interests and other public bodies, *e.g*: The Board of Agriculture, the County Councils Association, the Co-operative Union, railway companies and the County Land Agents' Association. MR. R. A. Yerburgh, M.P., has been appointed the first president and Lord Shaftesbury the chairman of the governors. The first meeting of the governors took place on October 9th last at the Westminster Palace Hotel.

TOBACCO IN QUEENSLAND.

Mr. R. S. Nevill, Tobacco Expert, writing to the *Queensland Agricultural Journal* of November, 1912, remarks that because tobacco is growing wild about the country it is no evidence that it can be cultivated profitably in any district. It requires a friable and not too heavy soil, a fairly humid climate though the rainfall may not be heavy. Pipe tobacco should be grown on the high country above the Range, inland, and cigar tobaccos on the coastal country.

It should be remembered that tobacco will not grow everywhere and for the information of intending growers he suggests that only a small experimental plot be tried at first and samples of the cured product submitted to manufacturers before going in largely. Good tobacco of both varieties is in demand at good prices.

BURMA.

Report of the Agricultural Department.

The Report of the Director (Mr. MacKenna) for the year ended June 30th, 1912, is to hand, and has as its chief heads: Agricultural Education, Agricultural Research and Experiment, Demonstration, Publications and the supply of information.

In Agricultural Education a small beginning has been made in training District Agriculturists by taking them through a short course of lectures and practical work in Agriculture, Chemistry, Botany and Entomology: while a hand book on School Gardening is about to be issued with a view no doubt of developing work on lines similar to those adopted in Ceylon.

Under Agricultural Research and Experiment a system of Agricultural Surveys, which are mainly crop Surveys, has been established in order to collect information so as to organise work on the most correct lines. At the two Agricultural Stations (one in Mandalay and another at Hmawbi) attention has been given to seed production with a view chiefly to meet the large demand for improved and selected seed-paddy. While these Stations or Farms are doing excellent work, the Experimental Gardens do not appear to have been much of a success, though from a financial point of view they have more than met the cost of their upkeep.

The rapidity with which the ground-nut industry came to be established in Burmah is well known. The area under the crop during the year was 142,316 acres against 102,232 in the previous year.

The record of cotton experiments with the object of introducing exotic varieties is reported to be one of complete failure; the only satisfactory results being those obtained with Cambodia cotton (the variety that has taken so well in the Madras Presidency) which gave a yield of about 108 lbs. clean cotton per acre.

As regards tobacco the average export of the manufactured product for the last five years has been close on 3,000 tons, that for the year under review figuring out at nearly 5,000 tons. This represents an average annual area of some 80,000 acres under the crop. The Department has for some time been distributing Havana and Virginia seed among growers and the Director is of opinion that the distribution has had a marked effect on the tobacco supply of the country.

Under rubber we read that the planting up of new estates is going on with vigour though it is feared without due regard to suitability of conditions.

Lemon grass cultivation is attracting some attention and locally extracted oil is fetching 50 cts. per oz. on the spot.

During the year the Department had numerous indents for castor seed which bids fair to become an important crop in the Province.

Experiments with soya bean were disappointing.

The Director speaks hopefully of the new Department as having settled down to useful and practical work with a better understanding of the special lines to be adopted, and expresses his conviction that in Co-operative Credit Societies the Department recognises an agency which will be of great assistance in giving practical effect to its recommendations—an opinion in which we entirely concur,

THE APPLICATION OF MANURES IN SOUTHERN INDIA.

Some Manures affected by the Ryot.

Mr. W. H. Harrison who has written an interesting "Note on the Indigenous Manures of South India and their Application" states, that the second portion of this note deals with the application of the manures indigenous to South India and it may here be at once stated that the dry lands generally receive practically no manuring, nor is it probable that they will do for some years to come. He observes that the value of crops usually raised on such lands is comparatively small and the ryots who cultivate them solely have no money to spare for manures, while a cultivator who possesses both dry lands and lands of a richer type such as garden or wet lands, naturally prefers to put his manures on the more productive soil. In a general way practically all the lands in South India are capable of yielding larger crops than at present and consequently as the demands on the food-supply increase, the tendency will first of all be to extend the productiveness of the wet and garden soil and not until these are yielding fully will any great development occur in dry land agriculture.

Green Manuring finds its main application in paddy cultivation and for this purpose green leaves and stems of Crukkam (*Calotropis gigantia*) and Wild Indigo (*Tephrosia purpurea*), the leaves of such trees as the Rain tree (*Pithecolobium saman*), Portia (*Thespesia populnea*), Pungam (*Pongamia glabra*) are trampled in at the time of puddling, or in some districts special green-manuring crops of the type of sun-hemp are raised for this purpose. Tests at Palur and Coimbatore show that this system of manuring gives an increased yield in paddy grain of about 18 to 20 per cent. and at the same time the cost of the manure is small.

Castor-cake is generally looked upon by the ryot as the best oil-cake for manurial purposes, but its use is restricted mainly to valuable crops such as paddy, sugarcane, betel-vines, etc. In the Godavari it is chiefly used on sugarcane, and its general use for this purpose has led to a large import trade from the surrounding districts.

Neem cake is in great demand by tea and coffee planters thus accounting for the large increase in price during recent years, but on the plains its use is not extensive compared to other cakes. It is reported that its use for paddy has rapidly extended in the Tinnevelly district during the last few years.

Experiments carried out on the Government farms show that cakes are efficient manures for paddy, but that the same effect can be obtained in a cheaper manner by green-manuring. On sugarcane the experiments at Samalkota show that here it is the manure most suited to the local conditions and that it is superior either to farmyard manure or artificials.

Castor-cake has also given encouraging results with the following irrigated crops: cholam (*Andropogon sorghum*), ragi (*Eleusine coracana*), turmeric and pepper. On cotton oil-cake has practically no effect.

Fish Manure has proved itself a very valuable and cheap manure for most crops and is very commonly used on the West Coast. Mixed with wood ashes it forms a complete manure and gives good results with sugarcane and pepper. The effect on paddy is good, a dressing of 540 lbs. per acre giving at Coimbatore an increased yield of 52 per cent. in grain and 34 per cent. in straw.

COCONUT PLANTING IN THE WEST INDIES.

BUD ROT.

In contributing an interesting article to the *West India Bulletin* on the subject of "Bud Rot of the Coconut Palm," Mr. J. B. Rorer, Mycologist to the Board of Agriculture, Trinidad, says that bud rot is undoubtedly the most serious disease of the coconut palm. It has been known for many years, but recently has attracted much attention throughout the West Indies on account of the losses resulting from its ravages and the increased value of coconut properties.

CAUSE OF THE DISEASE.—For many years, the cause of the disease was a matter of mere speculation, with the result that it was ascribed by many investigators to poor soil, lack of drainage and a great number of different insects and fungi. Within the past few years, however, careful studies have been made and the conclusions reached show that bacteria are the real cause of the trouble and that insects are instrumental only as carriers of infection.

J. R. Johnston, late of the United States Department of Agriculture, who has spent several years in the study of bud rot has proved by inoculation experiments that the disease is due to a specific bacterium which is so like *Bacillus coli* that the two cannot be distinguished; in fact he states that the disease can be produced by inoculation with pure culture of *B. coli*

CHARACTERISTICS OF THE DISEASE.—The disease gains entrance to the trees as a rule at the bases of the leaves or flower stalks. When the point of first attack is in the outer leaves or older flower stalks, the bud and young leaves may remain unaffected for a long time; but if the infection takes place in one of the central leaves, the bud soon rots and falls over often, leaving some of the nut clusters and outer leaves still attached to the tree. The course of the disease, once it has gained entrance to the tissues, may be either slow or rapid, depending upon many conditions, but in all cases the result is the same: namely, the whole top falls from the tree leaving the naked stem standing.

Whether or not the bacteria can gain entrance to the tissues through the unbroken epidermis or whether a wound is necessary he has not been able to make out. However, it is possible to infect trees without wounding them artificially, simply by pouring a pure culture of the causative organism into the crown.

Bud rot must not be confused with the so-called root disease although both may be present in the same tree. The latter trouble is always characterized by discoloured roots and a distinct red ring of tissue in the stem; while in the case of bud rot pure and simple the roots and lower stem seem perfectly healthy.

PREVENTIVE MEASURES.—Bud rot has been quite prevalent in Trinidad, but measures are being taken to prevent its spread. So far sanitation alone has been used; but the good results have been very marked in that the disease has been greatly reduced. To prevent the spread of the disease, trees which had been dead for a long time were simply felled, cut into junks from 4 to 6 feet long, piled around the stump together with as much

trash as possible, and burned. In cases where the trees were just beginning to show signs of the disease or had recently died, all infectious material such as the bud, the leaf bases and flower stalks and the upper portion of the stems, was destroyed at once. This was accomplished by burying the whole mass with lime in deep trenches; the remaining portion of the trunk may be cut up and burned as in the other cases.

Since this work has been done there has been a marked reduction in the cases of new infections and it points rather conclusively to the fact that the disease can be held in check by these sanitary measures, provided they are enforced on every property.

Although no trials have been made here in spraying coconut trees cn account of the difficulty of the work, some success has been attained in keeping down bud rot by the use of disinfectants placed by hand in the crown of the trees. Salt is the commonest substance used. A pound or two of course salt can be tied in a piece of coconut fibre and suspended in the crown of the tree in such a position that the rains will wash the brine down into the leaf bases. Some planters have tried iron sulphate and have reported favourably on its use; while still others use copper sulphate.

TOBACCO AND COTTON REPORTS.

TOBACCO.

The following appear in the *Bulletin of Agricultural Statistics* for October, 1912:—

BELGIUM.—Tobacco has suffered from the damp, especially at the time of drying and its quality is affected.

FRANCE.—The harvest is considered to be good.

IRELAND.—At the present moment the harvest is almost finished; as regards the quality it is inferior to the average but superior as to quantity.

SWITZERLAND.—The harvest of tobacco seems to be about normal. Tobacco growers are satisfied with both the quality and quantity.

CUBA.—Preparatory work, as well as sowings, are being carried out under good conditions.

COTTON.

EGYPT.—The Cotton worm has now spread to all parts, but no very serious damage has been done since that reported last month, It is now less likely to occur, as the cotton is ripening quickly in all parts.

LATEX IN PLANTS.

The *Gardeners' Chronicle* for October 1912 states that the use subserved by the milky juice or latex which occurs in many plants: Euphorbias, Poppies, and rubber-producing species generally, has been the subject of much discussion among botanists. Some hold that it is of the nature of a waste product; others that it represents an accumulation of food materials on which the plant may draw in time of need; others again combine these views and regard the latex, which contains various substances in solution and suspension, as serving both functions. Recent work by Bernard (*Ann. du Jard. Bot. de Buitenzorg* 1910) serves to show that latex may be a reserve of food substanes. By cultivating laticiferous plants in an atmosphere containing no carbon dioxide the formation of sugars is suppressed and the starved plants utilise the starch grains suspended in the latex.

LIME FOR TOBACCO LAND.

Mr. Temple A. J. Smith, writing to the *Journal of Agriculture, Victoria*, for October, 1912, says the value of lime for soils in which tobacco is produced has not yet been sufficiently recognised by growers in Victoria. Most of the land used for this purpose has been shown by analysis to be deficient in lime, and even where the land is known to have a fair percentage, applications especially in some new form, have advantageous results.

The ash of the tobacco plant contains large proportionate amounts of lime and potash, with a low percentage of phosphoric acid, as the following figures show, viz:—

Nitrogen	4·12
Potash	6·20
Phosphoric acid	·62
Lime	5·50
Magnesia	1·67

Tobacco is evidently dependent on lime as a food, he states, and for that reason alone a supply should be provided where it is known a deficiency exists.

The Effect of Lime.

The application of lime, apart from its value as a food in itself, is of even greater importance in regard to its effect in releasing and indirectly supplying potash and nitrogen for the crop's benefit. Lime also assists in supplying nitrogen indirectly, and at a greater rate, owing to its influence on nitrification and the temperature of the soil is slightly increased, an important matter in regard to tobacco.

The mechanical effect of lime on the soil in relation to tobacco-growing is especially valuable. All tobaccoes thrive best and are of better quality, when produced from free and well aerated soils; consequently the flocculating power of lime on those soils, liable to set closely, renders them more open and friable, bringing about the desired result.

Its effect on the soils is highly beneficial in counteracting acidity, in this way not only inducing a better growth of the crop but materially influencing the curing processes and fermentation later on in the sheds, this being due to the effect of the alkali supplied to the plant which, if deficient in quantity, interferes with the development and action of the enzyme, or ferment, through whose agency the cure and fermentation of the leaf is perfected.

The Different Forms of Lime.

The different forms of lime procurable have somewhat different effects on tobacco soils. Where heavy swamp land or peaty soils are cultivated the use of builders' lime, "burnt lime," will be found most advantageous. The builders' lime applied at the rate of from 5 cwt. to 10 cwt. per acre in the autumn will assist in decomposing the rough organic matter in the shape of undecomposed roots, weeds, etc., and render the soil sweeter and better fitted to produce good quality of leaf. On clay or silty soils the burnt lime also is desirable as it improves the temperature in cold soils and makes them more friable and open. On sandy loams gypsum

(sulphate of lime) gives good results, as also on chocolate soils; larger amounts, however, should be used, from 10 cwt. to 2 tons, as its effects are not so pronounced as those of the burnt lime. In all soils short of humus gypsum is safer to use than burnt lime, not having the caustic properties and consequently not destroying the vegetable matter to the same extent.

CEARA RUBBER.

The *Financial Times* of November 1, 1912, reports that at the second ordinary general meeting of the shareholders of the Manihot Rubber Plantations, Ltd. (East Africa), held on 31st October last, the Chairman of the Company remarked that last year they had produced 20,653 lbs. of rubber in a period of thirteen months, and this year they had produced 27,775 lbs. in the ten months under review. Last year they obtained for their rubber, in round figures, 3*s*. 7*d*. per lb., this year 4*s*. 2*d*. per lb. The yield for 382 acres planted and producing came out at 72·7 lbs. of dry rubber per acre.

The same paper publishes the remarks made by Mr. Moreau, Chairman of the Brieh Rubber Estate, Ltd., from which we learn that the profit and loss account discloses a profit of £9,500 14*s*. 7*d*. on a production of 68,000 lbs. of rubber as against a profit for the previous year of £2,886 17*s*. 4*d*. on a production 33,913 lbs. of rubber, which works out roughly to having more than trebled the profit on doubling the out-turn. The net price realised was 1½*d*. per lb. more than for the previous year, whilst the cost per lb. was much less on the increased production. This cost is now down to 2*s*. 2·34*d*. per lb. all in, and should become less as production increases. This 2*s*. 2·34*d*. per lb. cost includes depreciation and the whole of the London charges and Directors' remuneration, in addition to the estate cost, freight, insurance, brokerage etc.

A NEW ARTIFICIAL MANURE.

BI-PHOSPHATE.

We draw the attention of our readers to the following account which appears in the *Queensland Agricultural Journal* for October, 1912. The Acting British Consul at Christiania (Norway) stated in May last that the local newspapers published an account of a new kind of artificial manure which had been produced under the name of "bi-phosphate," said to be a by-product in the manufacture of nitrate of lime. On the 6th July the "Agricultural News," Barbados, referred to this manure, a notice of which appeared in that journal for 11th May, and quoted the "Board of Trade Journal" for 2nd May, 1912, in which further information is given concerning the manure:—

A sample of this has been forwarded to England by the British Acting Consul at Christiania, and it is stated that the product contains 26 per cent. of phosphoric acid and 23·8 per cent. of nitrate of lime. Of the phosphoric acid, 92 per cent. is in the citrate-soluble form, which means that this proportion will dissolve in a standard solution of ammonium citrate.

The further statement is made that the manure will be placed on the market, in future, with considerably higher percentages of both phosphoric acid and nitrogen.

It is expected that the price of the new manure will be low; its chief use will be in the replacement of superphosphate and basic slag. It is manufactured at the Notoddin Nitrate Works, Norway.

THE LIME.

VALUE OF THE SKINS OF THE FRUIT.

The *Agricultural News* of September 28, 1912, publishes a note on the Feeding and Manurial Value cf Lime Skins by H. A. Tempany, Superintendent of Agriculture for the Leeward Islands:—The disposal of the expressed skins obtained in the extraction of lime juice by milling is a question of some interest to those engaged in the lime industry. In some cases the lime skins are simply thrown away, but a far better practice is to utilize them either for feeding stock or for manurial purposes direct.

Cattle will eat lime skins readily and they possess value both directly as a fodder and also as a relish to the ordinary rations of stock.

On certain estates in Dominica the practice exists of making a species of ensilage of lime skins; this appears to be a useful method of dealing with them, since the limes produced in excess of the requirements of the stock on an estate during crop time can be utilized for feeding purposes out of crop. When properly handled, lime skins do not appear to suffer any deterioration when treated in this way.

The following analytical data obtained in the Government Laboratory for the Leeward Islands concerning two such samples of ensilage from estates in Dominica are of some interest in view of the complete absence of published information of this character at the present time. The samples were obtained and forwarded by Mr. J. Jones, Curator of the Botanic Station, Dominica.

	Sample A.	Sample B.
Moisture	79·6	76·5
Nitrogen	0·293	0·246
Equivalent crude protein ...	1·83	1·54
Crude fibre	3·2	5·1
Extracted matter	—	1·9
Albuminoid nitrogen	0·114	—
True protein	0·712	—

In the case of neither sample was the ash determined. Other determinations tend to show, however, that the ash content of lime skins is in the region of 1 per cent., assuming this value in the case of Sample B, we arrive at an approximate value of 14·0 per cent. for the crude carbohydrate content and 12·2 for the albuminoid ratio on the crude protein.

From this it will be seen that the ensilages have a distinct feeding value, though they are somewhat deficient in proteins. Under the head Extracted Matter must be included the residues of the essential oil not expressed in the processes of écuelling and milling; it is to this and the residues of citric acid, included under the head crude carbohydrates that the skins owe their value as a relish.

The following analysis of the manurial value of lime skins is reproduced from the Report on Sugar-cane experiments in the Leeward Islands for 1905-6:—

Nitrogen.	Ammonia.	Phosphoric acid.	Potash.
0·314	0·381	0·006	0·148

From the above analysis it is calculated that lime skins are worth $ 0·95 per ton for manurial purposes.

MANURING COCONUTS.

EXPERIMENTS IN TRINIDAD AND TOBAGO.

Manurial experiments are being made on two coconut estates in Trinidad and on one estate in Tobago, says the *West Indian Bulletin*. These experiments are under the control of the Board of Agriculture.

The manures are supplied free of cost to the proprietors but the cost of application as well as the cost of general cultivation are borne by the estate owners.

There are eight plots in each estate, two of which were only forked and no manure applied. These are kept as control plots.

The following experiments are being made:—

	Manures applied per tree.	Cost of manures per tree (landed in Port-of-Spain). $ c.
1	4 lb. lime 4 ,, kainit	4·86
2	6 ,, basic slag 1 ,, sulphate of potash	7·28
3	4 ,, basic salt 2 ,, nitrate of soda	7·68
4	2 ,, calcium cyanamide 2 ,, sulphate of potash	10·56
5	2 ,, bone meal 1 ,, sulphate of ammonia ... ... 150 ,, pen manure	14·22
6	2 ,, superphosphate of lime 1 ,, sulphate of potash ... ... 150 ,, pen manure	13·75

The manures were spread broadcast, about 3 or 4 feet from the trunk of the trees and 2 feet from the edge of the drains, and the surface loosened to a depth of about 6 inches with the aid of a fork.

Records of pickings are being kept from July 1, 1911. Printed forms were supplied to the owners for forwarding the results of each picking.

The nature of the soil and approximate age of the trees under experiment are shown below:—

Nature of soil.	Approximate elevation, feet.	Rainfall Jan. to Dec. 1910, inches.	Date when manure applied, 1911.	Age of trees years.
Undulating clay loam ...	100 ...	* ...	July ...	about 25
Flat sandy ...	25 ...	80·56† ...	July ...	about 35
Flat sand loam.	30 ...	85·47 ...	May ...	20 to 25

* No rainfall taken. † Average rainfall for 11 years is 56 inches.

At Beaulieu the experiments are being made in these sections or series; each plot is represented by a single row of palm trees. The plots in one series have received similar treatment to the corresponding plots in the other two series.

The palm trees are planted at a distance of 24 feet, and the area under experiment on each estate is approximately 8 acres or 24 acres in all.

As these experiments have only lately been started, no records of yields are as yet obtainable.

THE IRRIGATION WORKS IN MESOPOTAMIA.

THE GREAT EUPHRATES BARRAGE.

The *Geographical Journal* for November states that the first instalment of the vast works planned by Sir W. Willcocks for the irrigation of Mesopotamia by the storage of the Euphrates water is now nearing completion. Details as to the present position of the work, which is being carried out for the Turkish Government by the engineering firm of Sir John Jackson, Limited, have lately been received by Reuter's agency. The part of the scheme first taken in hand has been the building of the great barrage at Hindieh, with associated works by which the water is to be distributed down the old branch of the river, past the site of Babylon, to Hilla. The barrage is being built to the east of the present bed of the Euphrates, and will be 250 metres long, with thirty-five arches fitted with sluice-gates. The piers of these arches are now completed up to the springing of the latter. This barrage will raise the level of the water by 7 metres, while a subsidiary barrage immediately below will provide for a further difference of $2\frac{1}{2}$ metres. Adjoining the upper barrage there will be a lock for the use of the river traffic, while the lower barrage consists of a lock and a huge shelf of masonry. Work has also been begun on the Hilla regulator, a little above the barrage, which will consist of five arches. The excavation for this has been done and the masonry begun. These works finished, an earthern dam will be thrown across the stream, which will thus be turned into its new bed between the barrage and the regulator. The old branch has been cleared out, and will be properly canalized, while at Habbania an escape is being constructed by which the flood-water will be carried off into the old Babylonian reservoir. It is estimated that 600,000 acres of land will be plentifully irrigated as a result of the works. The operations have involved a vast amount of excavation, concrete work, masonry, pitching, etc., but there has of late been a plentiful supply of local labour.

RICE CROP PROSPECTS, 1912-13.

The Commissioner of Settlements and Land Records, Burma, reports under date 12th November, 1912, that the area under rice cultivation in the sixteen principal rice-growing districts of Lower-Burma is now reported to be 7,804,986 acres. This is 431,887 acres more than the area actually cultivated last year, but 29,876 acres less than the area as estimated in the first forecast. Almost the whole of this decrease is in the Insein and Syriam Districts. The area destroyed has risen to 81,381 acres, an additional 15,000 having been flooded in the Twantè Township of the Syriam District since the first forecast. Standing crops are healthy and prospects are good, but in areas where transplanting was late, and on high land more rain is wanted.

COCONUT PALM INSECTS IN TRINIDAD.

BEETLES AND CATERPILLARS.

The *West Indian Bulletin* has a paper on the above subject by Mr. F. W. Urich, Entomologist to the Board of Agriculture, Trinidad. Mr. Urich states that on the whole the coconut palm is fairly free from any serious insect pest; occasionally attacks are isolated and sporadic; many of the insects appear to follow fungus disease or attack trees growing under unfavourable soil conditions; others again are well kept in check by natural enemies and only increase when these enemies are prevented from doing their work.

Beetles Boring in the Stem.

The palm weevil (*Rhynchophorus palmarum*) has always been credited with being most destructive to coconuts, but with few exceptions is generally a secondary pest. The female beetle appears to be attracted by the acetic fermentation which takes place in diseased trees; further, in most cases it has been observed to select only trees injured by cuts, cracks or abrasions for ovipositing. Young trees up to four and five years of age are those mostly attacked. Full-grown trees are not touched. Mr. Dolly of Myaro, a most careful observer, states Mr. Urich has pointed out that when young trees are growing in old cultivation the falling fronds of the tall trees sometimes damage the tender leaves of the small ones and so open the way to a beetle attack. The part of the stem selected is generally the soft tissue near the top and at the bases of the fronds, the larvæ sometimes eat into the petiole of the leaf when it is fairly young.

The remedies employed have been preventive and consist in tarring wounds. If the growing point is attacked, and as long as the bud is not damaged, the larvæ are cut out and the wound dressed with tar.

The Bearded Weevil.

The bearded weevil (*Rhina barbirostris*) has different habits from the preceding species, inasmuch as it attacks full or half-grown trees. It confines its attack only to the stem. The damage is done by the larvæ which bore regular galleries in the hardest part of the stem. Like the palm weevil, the bearded weevil is attracted by fermentation and it is significant that trees suffering from bud rot are attacked at the top and those affected by root disease at the base of the stem. The female beetle is not attracted by wounds but when she lays eggs she gnaws a little depression in the hard bark of the stem. The methods of control adopted have been preventive and consist in tarring the stem of the trees that have been scorched. A mixture of white lime, to which is added 5 lb. of arsenate of lead to every 50 gallons of solution, is also used. Ambrosia beetles (*Xyleborus perforans*) and allied species attack trees under the same conditions as the bearded weevil.

There is quite a number of caterpillars, Coccidæ and Aleyrodidæ to be found on coconut leaves, but with one or two exceptions none of them do any damage as they are either not numerous or are kept in check by natural enemies.

Remedial Measures.

Some spraying experiments undertaken show that commercial lime-sulphur used in the proportion of 1 to 15 will free a tree from ants for six months and that arsenate of lead in the proportion of 5 lb. to 50 gallons of water acts as a preventive against them. The spraying of tall trees is not quite easy, but it can be done very well by a good coconut picker. The apparatus used consists of a good barrel pump, 50 feet of ¾ inch india-rubber hose and a rod of about 10 feet. The man ascends the tree carrying the rod attached to his belt. Arrived at the crown he stands up against the stem by means of his climbing loop and does the spraying.

The insect locally called rhinoceros beetle (*Strategus anachoreta*) is occasionally injurious to young plants by burrowing from beneath into the soft tissues of the plant and destroying the bud. An application of lime around the trees after planting out appears to protect them.

The fermenting tissues of a coconut palm affected by bud rot attract quite a number of insects. The palm weevil and bearded weevil have often been mentioned in connexion with bud rot, but they are never found in the rotting bud. The insects more likely to transmit the disease are the scavenger flies whose larvæ live in the decomposed bud.

THE EFFECT OF SOIL AERATION ON PLANT GROWTH.

C. Hunter, B.SC., who has contributed an interesting paper to the *Proceedings of the University of Durham Philosophical Society* states that as a result of the various experiments which have been carried out with the object of investigating the connection between soil aeration and plant growth, it has been found that—

The circulation of the air in the soil affects the development of the root system and through that the development of the sub-aerial portions of a plant.

The production of artificial air currents in the soil appears to be beneficial to plant growth. This point is at present undergoing further investigation.

These experiments were undertaken at the suggestion of Professor Potter.

SESAMUM.

Bulletin No. 13 of the Department of Agriculture, Western Australia, states that Sesamum, called Teel in India from its Sanscrit name, is exported as Gingelly to Mediterranean oil mills and Great Britain to the extent of about £2,000,000 a year. These plants have been tried with great success both at Beagle Bay and at Port Darwin. Several varieties are grown; the black-seeded one contains 40 to 50 per cent. of oil which is clear, limpid, has no smell and does not become rancid. The white-seeded sesamum is used as an article of food. The residue left after the extraction of the oil affords an excellent stock feed. The crop is easy to grow and deserves attention.

CAMBODIA COTTON EXPERIMENTS IN THE BOMBAY PRESIDENCY.

The *Agricultural Journal of India* for October, 1912, publishes a paper by T. F. Main, Deputy Director of Agriculture, Bombay Presidency, from which we take the following extracts:—

The first point which required investigation was the suitability or adaptability of this cotton to local conditions. Experimental cultivation during the last three years has proved that this cotton is well adapted for cultivation at Gadag as may be inferred from the results obtained at Gadag in comparative experiments with local saw-ginned Dharwar American herewith tabulated :—

Season.	Yield per acre seed cotton in lbs.		Ginning Percentage.		Remarks.
	Cambodia.	Saw-ginned Dharwar American.	Cambodia.	Saw-ginned Dharwar American.	
1909-10	430	381	42·80	30·87	
1910-11	410·5	221	38·30	30·70	A moderate season
1911-12	197	101	38·05	28·30	A very bad season

The importance of these results lies not only in the relatively heavier yield and higher ginning percentages of this cotton, but also in proof which they provide that Cambodia cotton is a drought-resisting variety of exceptional capacity. The most striking instance of this was offered in the season of 1911-12 which was characterised by the worst drought experienced for many years.

The next point which had to be cleared up was, which of the various Cambodias was the best. Comparative experiments leave little doubt on this point for No. 102-E., received originally from Mr. Aiyer of Trichinopoly, has annually proved its superiority over all other both as regards yielding capacity and ginning percentage.

Having shown the suitability of Cambodia cotton for cultivation in the south-east of the Dharwar District it may be convenient to summarise here its advantages which have been found over local saw-ginned Dharwar American. These are :—

(1.) A higher ginning percentage of at least 7 per cent. The ginning percentage of saw-ginned Dharwar is normally about 30 per cent., while a very moderate sample of (102-E) Cambodia gins at 37 per cent. and good samples gin from 1 to 2 points higher. The highest ginning percentage attained by this cotton on the Gadag Farm was 42·8 in 1909-10

(2.) A higher yield in the proportion of at least 9 to 8.

(3.) The seed cotton being produced in large well-opening bolls can be picked cleaner.

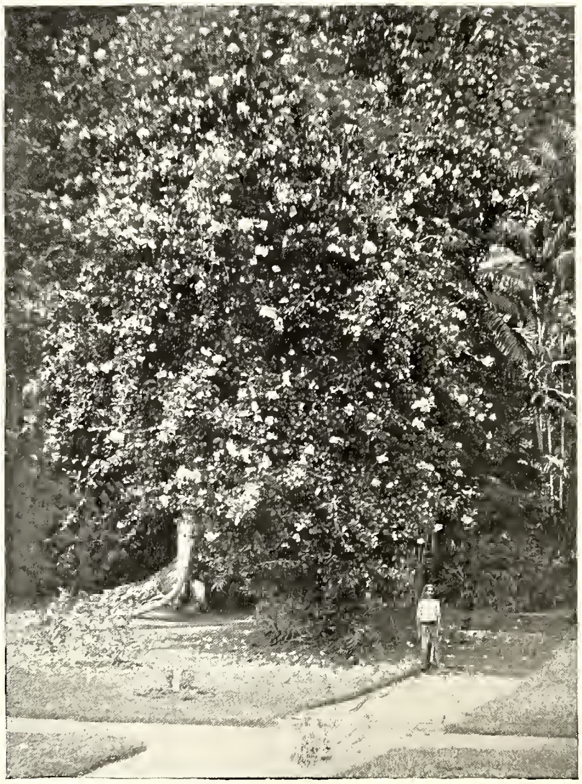


Photo by H. F. Macmillan.

BIGNONIA MAGNIFICA.

A Beautiful Climber, bearing Magenta Blossom in Enormous Profusion.

(4.) The colour of the cotton is brighter and staple more uniform.

(5.) The cotton is " bulkier."

(6.) It is markedly resistant to red leaf blight which so severely attacks saw-ginned Dharwar.

Opinions of Cultivators.

In 1909-10 100 lbs. of seed was given out among 14 cultivators all of whom reported satisfactory results. In 1910-11 a couple of thousand pounds were distributed and more would eagerly have been taken up had it been available because the price offered for this cotton in the Gadag Market for the produce of the 1909-10 crop was Rs. 180 against Rs. 123-8 per naga of 1,344 lbs. of seed cotton for saw-ginned Dharwar American. In the current season (1912-13) arrangements have been made to distribute 30,000 lbs. of seed estimated to sow 3,000 acres.

BIGNONIA MAGNIFICA.

(Illustrated.)

The family of *Bignoniaceæ* is especially noted in the vegetable kingdom for beautiful and showy flowers, and comprises some of the most gorgeous flowering trees and climbers known to us. We give an illustration of the type genus Bignonia, the members of which are all climbers. It is amongst the most showy of the family, few if any surpassing *Bignonia magnifica* in brilliance of blossom. It is a rapid growing, strong climber, with large bell-shaped flowers borne in great profusion. When in full blossom the plant forms a conspicuous spectacle. It seldom, if ever, produces seed in Ceylon but is readily propagated by cuttings. The latter should be inserted in the rainy season in light sandy soil mixed with leaf-mould.

TYPHOONS.

The typhoon which recently visited Japan, isolated Tokyo telegraphically from September 22 to 24, and carried widespread devastation, is said to have been the severest experienced in half a century, states *Nature* of October 3rd. Accounts so far are meagre, but according to reports already received the loss of life and damage to property afloat and on shore are appalling. The storm appears to have been most violent in the middle of the south coast. Typhoons are revolving storms of tropical origin that may occur in Far Eastern seas—the North Pacific or the China Seas—during any month of the year. In Japan and its neighbourhood they are, as a rule, confined to the months of June to September inclusive, and are most frequent in September. In general, all tropical revolving storms follow a parabolic track. The typhoons that visit Japan in September usually originate in the Pacific south-eastward of Formosa, move N. W. by W., recurve when abreast of that island, and then take the direction of the Japan Sea. Algué divides the tracks of typhoons in the Far East into two classes—those of the Pacific, which do not cross the meridian of 124 E., and those of the China Sea. A typhoon is said to travel rapidly when its rate of motion exceeds twelve nautical miles an hour; if its rate of motion be less than six miles an hour it is said to travel slowly. The September typhoons come under the former category.

SWEET POTATOES.

Some data from Western Australia.

This plant which belongs to the *Convolvulaceæ* does best in warm climates where it replaces the Irish potato, says the *Bulletin of the Department of Agriculture, Western Australia*: There it is cultivated as a field crop whereas the Irish potato is regarded as a garden crop, which is the opposite of the practice of the cooler districts of the South.

It does best where the land is moist or where frequent rain is recorded during the period of growth. Wet weather at the time of ripening induces a second growth and is injurious to the raising of a profitable crop.

Although the plant is perennial it is treated as an annual. As it flowers rarely and the seeds give rise to a variety of types, slips or sets about four inches long growing on roots placed in hot-beds are used when sufficiently developed and one single sweet potato will produce quite a number of these slips.

Compared with Irish potatoes as a foodstuff, sweet potatoes show about one and a half times as much nutritive matter; they contain about 10 per cent. less water, the same proportion of mineral constituents, a little less protein, more fat and about 10 per cent. more carbohydrates as starch and sugar.

One or two bushels of small potatoes will produce enough slips to plant an acre. A second and sometimes a third growth of slips will show after the fiıst one is ready to pull. If green vines are available cuttings may be used instead of slips grown on the tubers. When slips are pulled they should be dipped at the base in liquid mud made of clay and cow manure.

In the human diet it should be supplemented by an addition of foods rich in protein, such as lean meat, eggs, milk, peas and beans. In feeding stock, a proportion of cowpeas, soy beans or any of the legumes should be added.

The varieties are numerous; they are either syrupy; mealy or intermediate. The flesh is yellow or white; the leaves deeply indented, shouldered or round; the skin is white, yellowish, light-red or purple.

The soil most suitable as regards its texture for the growth of that root is a sandy loam which remains friable and does nct bake. It does well also in limestone clay, but there the crop is harder to dig.

A four-ton crop removes in the roots alone 30 lbs. of nitrogen, 13 lbs. of phosphoric acid, 64 lbs. of potash. The vines which weigh more than half the weight of the crop are richer in nitrogen. It is thus seen that heavy fertilising is required to ensure a large crop; humus is very desirable and can be provided by growing the sweet potatoes after a leguminous crop or a green crop fed off on the ground. A wide interval in the rotation is desirable to guard against pests and diseases. If the soil is not wet at the time of planting, some water should be poured over the slip so as to settle the soil around it; in that case some dry earth is raked over to check evaporation. Shallow cultivation is necessary after planting to break the crust and root out weeds.

The crop is ready to dig when the roots are mature, which can be ascertained by cutting a few roots. If, on drying, the wound heals over with a whitish starchy appearance, the roots are ripe; if they turn blackish in colour, they are not. Digging may be done in the field by means of a ridge plough, after the vines have been cut. Any unsound and bruised root will decay and should not be stored. After the roots have sweated a little they can be packed in ventilated cases for marketing.

LAND AND WATER ON THE EARTH'S SURFACE.

The publication two years ago, by A. Baldit, of the results of a new measurement of the land and water areas on the surface of the globe, has suggested to Dr. H. Wagner a comparison, says the *Geographical Journal*, of the new results with those previously given.

As regards the whole surface between 80°N. and 60°S. the percentages obtained by Wagner, Krummel and Baldit vary inappreciably, Wagner showing 28·5 per cent. of land, the other two 28·4 per cent. The total land area within those latitudes is given by Baldit, however, as 550,000 square kilometres less than Wagner's figures. With the necessary corrections to Baldit's estimate for the extreme north and south, the results for the whole surface of the globe appear as follows: Land 149,000,000 sq. kilom. (57,500,000 sq. miles); water 361,000,000 sq. kilom. (139,400,000 sq. miles) or 29·22 and 70·88 per cent. respectively. This gives the proportion of land to water as 1: 2·42.

DESTRUCTION OF LANTANA.

This plant is apt to become a great nuisance in tropical countries on cultivated and pasture land, owing to its dense growth and extraordinary vitality. It appears from the *Journale d' Agriculture Tropicale* (1912, 12, 154) that an attempt is now being made in New Caledonia to combat the pest by introducing a species of fly of the Agromyzidæ family from Hawaii. The insects have been distributed in the environs of Numea on land infested with Lantana. As a result the larvæ of the fly have been found in many of the seeds and it is intended to extend its distribution in the colony. The result of the experiment will be watched with interest; it must be borne in mind, however, that where a new animal species has been introduced to destroy some pest it has itself sometimes proved to be injurious in other directions.—*Imperial Institute Bulletin.*

BENGAL RICE.

The yield of rice per acre in Bengal is estimated (*Spice Mill*, 1912, 35, 526) at about 800 lb. of autumn to 1,200 lb. winter rice; in Eastern Bengal and Assam from less than 700 lb. of autumn-sown to slightly more than 1,100 lb. of spring or summer-sown; in Madras the yield varies from 900 lb. grown on non-irrigated to 1,100 lb. on irrigated fields; in Lower Burma which has very little irrigation the yield is 1,176 lb. on non-irrigated soil. —*Imperial Institute Bulletin.*

THE FERMENTATION OF CIGAR TOBACCO.

In a paper on the cultivation of cigar tobacco with special reference to Java, which appears in the *Bulletin of the Imperial Institute*, Vol. X, Nos. 2 and 3, the following account of the process of fermentation is given:—

The dry but still flexible leaves are stripped from the rods and placed in large baskets for transport to the fermenting-sheds. These are large well-built places, which cost about 30,000 florins (£2,500) each to construct. The walls, which are freely provided with windows, are built of brick, whilst the supports and beams consist of teak. The roof is generally tiled and the floor cemented. As each load of tobacco is brought into the fermenting-shed it is weighed and passed to the women labourers, who make it into bundles of fifty or fifty-five leaves, which are used to form the fermentation heaps. Through the greater part of the length of the building runs a wooden platform, about 20 in. high, on which the fermentation heaps are built. These heaps are formed in the following way: A rectangular mat is spread on the platform and on this about 500 bundles of tobacco leaves are packed closely in a single layer. On this is placed a second layer, and so on until a rectangular heap of tobacco bundles, made up of twenty layers, each containing 500 bundles, is formed. The bundles are so packed on the outside of the heap that the lower ends ("butts") of the leaves are all outside. The heap is built round a bamboo as a centre-piece, and this serves to hold a thermometer, which registers the temperature throughout the fermentation process. The heap is then covered with a mat to which a slate or board is attached on which the temperature of the heap is recorded twice daily at 6 a.m. and at 5 p.m. After about five days the temperature has risen to 60° C. These primary heaps are called *a*-heaps. Two *a*-heaps which have reached this stage are then unpacked and re-built together into what is known as an *A*-heap, which is of the same length and width as the former one but consists of forty layers instead of twenty and is therefore twice as high as the *a*-heap. When the *A*-heap has reached a temperature of 60° C. it is taken to pieces, together with a second similar heap, at the same stage, and the two are re-built together into a *b*-heap consisting of at least 50 layers, each containing 750 bundles of tobacco leaves. When the *b*-heap has reached a temperature of 60° C. it may be either taken to pieces and re-built of the same dimensions (*B*-heap,) or it may be amalgamated with a second heap in the same condition to form a *c*-heap, consisting of over 50 layers, each containing 1,500 bundles, and this in turn is allowed to ferment until its temperature rises to 60° C. At this stage fermentation is generally complete. In amalgamating or re-building heaps care is always taken to place the bundles that were on the outside of the previous heap in the middle of the new one so that the tobacco may be uniformly fermented. The heaps are shaken every day to prevent the bundles sticking together. The process thus outlined is that normally followed, but the rapidity of fermentation is dependent on many variable factors and consequently the whole process has to be carefully supervised by an expert, and modifications are introduced as required; thus it is not uncommon for *a*-heaps to be re-built directly into *b*-heaps, and so on. It is clear from available data that as the tobacco ages and becomes more highly fermented, the fermentation temperature rises more slowly in spite of the fact that the heaps are steadily increased in size.

COMMITTEE OF AGRICULTURAL EXPERIMENTS, PERADENIYA.

SEPTEMBER MEETING.

Minutes of a meeting of the Committee of Agricultural Experiments held at the Experiment Station, Peradeniya, on September 12th, 1912.

Present :—The Director of Agriculture (Chairman), Messrs. G. C. Bliss, R. G. Coombe, N. W. Davies, G. H. Golledge, H. Inglis, W. N. Tisdall, the Government Entomologist, the Government Mycologist, the Government Chemist, the Superintendent of the Experiment Station Maha-iluppalama and Dr. R. H. Lock, acting as Secretary.

1. Read and confirmed minutes of previous meeting.
2. Read Progress Report.
3. Read Progress Report for Experiment Station, Maha-illuppalama.
4. Discussed the introduction of Castor seed cultivation among the natives of districts bordering on the Northern Railway.
5. Submitted tables showing results of Rubber Tapping Experiments at Henaratgoda.
6. Read correspondence with Mr. Herbert Wright and the Secretary of the Rubber Growers' Association with reference to the Henaratgoda Experiments.
7. Resolved to approach the Ceylon Planters' Association with regard to the collection of data on the spacing and cutting out of rubber.
8. Resolved to begin manuring experiments on 3 acres of Hevea rubber newly cleared of cacao. Half acre plots to be treated as follows :—

All the plots to be tapped daily on the half-spiral system with four cuts per tree.

One plot to be treated with a general mixture at the rate of 840 lbs. per acre.

Three plots to be treated with general mixtures containing an excess of Nitrogen, Phosphorus and Potash respectively.

Control Plot.

9. Resolved that coloured plates of the various fungus diseases of Hevea be prepared and circulated.
10. Resolved that the Government Mycologist be asked to visit the Kalutara District to confer with Planters on the subject of Rubber Canker.
11. Discussed the question of advances and payment of coolies.
12. Discussed the question of additions to the number of unofficial members serving on the Committee.
13. Resolved to open a new plantation of Hevea, half to be planted at a distance of 20′ × 20′ and half at a distance of 20′ × 10′.

14. Discussed the Oxalis Pest. Decided that no definite recommendation could be made pending further investigations. It was suggested that it might be made an offence under the Pests Ordinance to allow the plant to flower on estates.

15. Resolved that Mr. BAMBER be asked to furnish an early report on the Tea Manuring experiments on Lorne Estate.

R. N. LYNE,
President and Chairman,
Committee of Agricultural Experiments.

NOVEMBER MEETING.

MINUTES of a meeting of the Committee of Agricultural Experiments held at the Experiment Station, Peradeniya, at 3 p.m. on November 7th, 1912.

Present:—The DIRECTOR OF AGRICULTURE (in the chair), the GOVERNMENT ENTOMOLOGIST, the GOVERNMENT MYCOLOGIST, the Hon'ble Mr. E. ROSLING, Messrs. G. C. BLISS, R. G. COOMBE, W. COOMBE, H. D. GARRICK, G. H. GOLLEDGE, H. INGLIS, C. O. MACADAM, W. N, TISDALL, the SUPERINTENDENT MAHA-ILUPPALAMA EXPERIMENT STATION, acting as Secretary, and the following visitors:—Messrs: O. T. Faulkner, K. G. Marsden, P. A. Keiller and H, A. Wickham.

1. Minutes of the ptevious meeting were read and confirmed.

1*a*. The Chairman explained that the Manuring experiments of Hevea rubber had not yet been begun and that Mr. Bamber's report on "Tea Manuring Experiments" had not been received.

The Director stated that he had informed the Government that Oxalis was not in his opinion a pest in the usually accepted meaning of the term.

2. Read Progress Report of the Experiment Station, Peradeniya. In reference to the collecting of cankered pods, Mr. Rosling stated that the Committee had at some previous meeting given instructions for diseased pods being collected once a month. Decided that this practice should be renewed.

3. Resolved that another plot of Nicaraguan cacao be planted from seed of the present plot, to determine whether the types breed true.

Hon'ble Mr. Rosling asked what prospects the Department considered Fourcroya had in the dry country, explaining that in Mauritius plantations of Fourcroya were doing well. The Director replied the point had not been investigated but in his opinion Sisal was to be preferred, one reason being it had a higher percentage of fibre than Fourcroya.

4. Read Progress Report of the Experiment Station, Maha-iluppalama.

5. Discussed the revision of accounts in the monthly report form and it was resolved that the Committee not being particularly concerned with the accounts it would suffice to lay the statement on the table instead of circulating it. It was the opinion that the form and the statement could be improved.

6. Resolved that Mr. Bamber be asked to visit the Lorne and Portswood tea plots and report on the same forthwith.

7. Specimens of discoloured crèpe were exhibited and discussed and Mr. Golledge promised to furnish the Chairman with the results of some investigations he had made on the cause of discolouration.

8. Thinning out and manuring of rubber was discussed, and it was suggested that the Director of Agriculture should take up both these questions when the new Department became properly organised and staffed.

8a, Resolved that Mr. Joseph Fraser be asked whether it would be possible for him to attend the next meeting and give the Committee the benefit of his views on the question of manuring rubber.

9. Discussed the Northway system of tapping.

Circulated specimens of bark from Hevea trees which had been under this system. It was pointed out that the interesting stage at Deviturai Estate was now approaching when renewed bark will first be tapped (end of this year).

10. Announced that some new experiments had been started at Henaratgoda to determine the effect which light and air has on the yield of the old Hevea trees that were planted on the outside and have had plenty of room. Also whether the results obtained by Dr. Lock on the interval experiment apply to the single V system as well as to the 3 V. The Hon'ble Mr. Rosling stated that in his belief the trees of the Second and Riverside Plantations were planted in about the year 1886 and would therefore now be 26 years old,

11. An inspection was made of the specimens of Wickham's hard cured rubber and of Wickham's Rubber Smoker at work.

PROGRESS REPORT OF EXPERIMENT STATION PERADENIYA

FROM 13TH SEPTEMBER TO 7TH NOVEMBER, 1912.

TEA.—There was a general falling off in yield during September, but a recovery during October.

The Dadaps in plot 149 were pruned on October 16th and 17th, and yielded 2851 lbs. of mulch.

The Albizzias in plot 150 were pruned on October 18th and 19th, and yielded 2,585 lbs. of mulch.

CACAO.—There is every indication of the crop which has now set being an exceptionally heavy one.

The trees have been comparatively free from canker.

Canker in the pods has been rather prevalent, and as the practice adopted here of removing fungus pods only during the rounds of picking results in diseased pods remaining for some time on the tree to their detriment, two special coolies have been put on, whose sole duty it is to make repeated visits to the plots for the purpose of collecting all diseased pods.

Dr. Lock has examined every tree in plots 88 and 89, and has marked all those which do not belong to the Nicaraguan variety. The marked trees are now being cut out.

On September 14th row E in the five acre plot of young Forastero was manured with 100 lbs of Sulphate of Ammonia and then disc-harrowed.

RUBBER.—The selected seed obtained from the best yielding tree at Heneratgoda has produced a high percentage of healthy plants. On October 10th nurseries were sown with some 26,000 seed from old Peradeniya trees. The germination is fairly satisfactory.

The lower halves of plots 77-78 measuring one acre in extent which were under old cacao and coconuts, have been felled and cleared preparatory to being planted with seedling Hevea.

Trials with Mr. WICKHAM'S SMOKING MACHINE were started on October 22nd. Owing to the difficulty in obtaining sufficient latex from any one experimental plot, it was decided to start tapping all the trees in plots 83—86; the method adopted is the single V half way round, 18 inches from the ground, tapped daily.

COCONUTS.—Of the manurial plots

Plot No. 8 was ploughed on October 21st—this is the second time during the year.

Plot No. 9—the necessary bi-monthly cultivation and application of artificial soluble mixture was carried out on October 22nd. On November 4th a start was made to free the plots from cheddy gowth,—the green material being mulched round the trees on Plot 6. Weight of material applied per tree.........50 lbs.

In mid-October, red beetles were found to be attacking the young palms in plot 62. One tree had to be destroyed, but it is hoped that the other half dozen trees under treatment will recover. A special cooly has been put on for this work.

Two young plants, from nuts recently brought from Perak, which were growing near the offices in the Gardens were on October 25th removed to the pineapple plot close to the Experiment Station Office.

PADDY.—The nursery plants having arrived at a suitable size the operation of transplanting was started on October 17th, single plants being put out at 12 inches apart. Nursery plots 3, 4 and 8 were dealt with in the order named, the lower end of the field being planted first.

The cost of transplanting per acre was Rs. 8.

MAIZE.—One acre of Hickory King was harvested on October 23rd, the product of each row being kept separate for line seed selection.

GREEN MANURES.—A small bed of *Indigofera anil* has been established. The following green manure plots have been cut, yielding as below for 1/100th of an acre.

No. 1 Leucæna glauca.......................229 lbs.
No. 2 ,, ,, ...241 ,,

GENERAL.—55 visitors have been conducted round the Station since the last meeting.

G. HARBORD,
Acting Superintendent.

PROGRESS REPORT OF EXPERIMENT STATION:

MAHA-ILUPPALAMA, FROM SEPTEMBER 13TH TO NOVEMBER 7TH, 1912.

COCONUTS.—In September steps were taken to have all the rubbish from the trees burnt before the rains set in.

It has been found necessary to burn four trees which were badly infested with red beetle, other affected trees are being treated and watched daily.

The heavy rains of October have been especially beneficial to the plot of year old coconuts growing on unirrigable land.

PADDY.—The trial plots extending over 9 acres were harvested in September, and the following results were obtained :—

The plots are all one acre plots.

	Kaivarasamba		4 months paddy.				
1	bushel sown	broadcast	gave	...	...	37½	bushels
¾	,,	,,	,,	...	...	38¾	,,
½	,,	,,	,,	...	...	37	,,
¼	,,	,,	,,	...	...	43¼	,,
	Heenati.		3 months paddy.				
2½	bushels sown	broadcast	gave	...	...	38	bushels
2	,,	,,	,,	...	...	27	,,
1	,,	,,	,,	...	...	35¾	,,
¾	,,	,,	,,	...	...	27	,,
½	,,	,,	,,	..	...	37	,,

The 9 acres are now being prepared to receive a crop in the coming season, the idea being to make comparative trials with eight varieties of 3 months paddy obtained from different parts of the Island, the 9th acre will be control plot of the local "Heenati" variety.

With regard to the trial which was recently carried out with the object of obtaining some information concerning the damage the paddy bug is capable of doing, the following results were obtained :—

Two small plots, each being 36 square feet in extent, were prepared side by side. One plot was completely protected by mosquito netting, and the other plot was left unprotected.

The protected plot gave a return equivalent to 86 bushels per acre.
The unprotected plot ,, ,, ,, ,, 43 ,, ,,

COTTON.—During the second week in October, a 10-acre block of recently cleared jungle land was sown with American Improved Upland variety—Allan's Long-stapled.

Method of Sowing in rows 4 feet apart.

Six seeds to each hole at 18 inches apart in the row. The crop is coming up satisfactorily.

On October 29th 2 acres were sown with Egyptian Variety Sakkelarides, as a catch crop under year old coconuts on unirrigable land.

SISAL HEMP.—A 7-acre block of recently cleared jungle land was cleaned up in September and October.

The land is being pegged out at 5 feet × 8 feet, and suckers are being planted out as the work proceeds.

G. HARBORD.
Superintendent.

COTTON IN INDIA.

The *Bulletin of the Imperial Institute* for October last deals with this subject and refers to the efforts made by the Department of Agriculture to improve indigenous varieties of cotton and give a trial to exotic varieties. An account is given of the examination and commercial valuation of samples from Madras, The Central Provinces, Eastern Bengal and Assam, and Burma.

The comparative examination of the Uppam and Karunganni constituents of Tinnevelly cotton has shown that the former variety is of much coarser staple than the latter, the average diameters being respectively 0·00084 in. and 0·00074 in. The Karunganni cotton is thus seen to approximate in fineness to Egyptian cotton, whilst the Uppam has the ordinary coarse character of most Indian cottons. In other respects the sample of Karunganni is little, if at all, superior to the Uppam. It appears, however, from the information supplied by the Deputy Director of Agriculture in Madras, that the growth of the Karunganni has been unfavourably affected by the weather. The acclimatised "Cambodia" cotton is of very satisfactory quality and indicates that it may be possible to grow successfully an American type of cotton on an extensive scale in India. The "Georgia" sample is of good quality but is inferior to the acclimatised Cambodia cotton owing to the presence of stains. The results of this trial, however, fully justify a continuation of the experiment.

The samples from the Akola Experimental Farm were of high grade for Indian cotton. The chief defects were that they were of somewhat inferior strength, and that they had been injured to some extent during ginning, numerous gin-cut fibres being present in each sample. The commercial experts who valued the samples received in 1911 reported that with the exception of "cutchica" they were all of a much higher class than "superfine," and were cleaner than any Indian cotton which the firm had previously handled. Indian cultivators should be encouraged to grow cotton of the character of these samples in preference to the inferior "jari" varieties which are now so largely produced.

The chief cotton produced in the United Provinces is of an inferior grade, known in the trade as "Bengals," and although experiments have been made on the hybridisation of this cotton, and several crosses have been obtained, which give promise of being a considerable improvement on existing local varieties, there seems to be little hope of improving this cotton to a sufficient extent. Probably the introduction of some form of "Upland" cotton would be the solution of the difficulty.

The only localities in East Bengal and Assam where cotton is commercially grown are the Garo Hills and Chittagong Hill Tracts. In quality the cotton (a variety of *G. arboreum*) was short and remarkably coarse and rough.

The Cuban, Georgia Upland, Cambodia and Bani cotton from Burma were on the whole of very satisfactory quality, but with the exception of the last they were rather lacking in strength and were slightly stained. The stains were doubtless caused by insect pests, the presence of which was clearly demonstrated by the condition of the seeds. It is therefore

evident that it will be necessary to adopt measures to check the spread of insect pests and to reduce their depredations. If these cottons, as grown, gave a good yield per acre, the results of the trials must be regarded as very encouraging. The American and Cuban would appear to be more suitable than the Egyptian.

PEASANT PROPRIETORSHIP IN HOLLAND.

PROPOSED LEGISLATION.

The following account is reproduced from the *Bulletin of the Bureau of Economic and Social Intelligence* in the *Journal of the Board of Agriculture* for November:—" As a result of the report of a Commission appointed in Holland to inquire into the economic condition of agricultural labourers, a Bill has been brought forward to "enable agricultural labourers to become proprietors of land with dwelling-houses, or to rent land."

According to this Bill, the land, the value of which must not exceed about £200, is to be purchased through the medium of approved associations to be formed in every canton and having for their sole aim the promotion of the purchase of land by agricultural labourers. The money for purchasing the land will be lent by the State to the communes of the cantons and by them to the associations, in each case at the rate of 3½ per cent per annum. Facilities for purchase are only given to agricultural labourers between the ages of twenty-five and thirty who can pay at least one-tenth of the purchase value ; the remaining nine-tenths are lent to the purchaser by the associations (or communes.)

Repayment of the borrowed money is made as follows :—For the first two years interest must be paid at the rate of 3½ per cent.; from the third year onwards repayment must be made in thirty annual instalments at 5½ per cent. The purchaser, however, may if he desires pay less, for the Bill authorises him to burden the property he has bought to the extent of one-fourth of the sum borrowed with an annual charge redeemable at any time or only after the complete extinction of the remainder of the debt.

As a guarantee for the sum borrowed, the purchaser gives a mortgage on the property bought but the deeds, etc., are free from stamp and registration duties. The purchaser is not allowed to let the land while the instalments are unpaid, or to dispose of it to anybody else during his lifetime, but his testamentary liberty is in no way restricted.

The Bill also provides that small plots of land may be let to agricultural labourers who have no land. The rent must not exceed about £2. 10*s*. per annum. The land must be suitable for cultivation and well situated. The letting is carried out by the associations mentioned above, or by the communes.

YIELD OF GROUND-NUTS.

Experiments in the Bombay Presidency with different varieties of ground-nuts have given excellent results in several cases (*Ann. Rep. Dept. Agric. Bombay* 1910-11, p. 31). Thus, at Kilgeri, Spanish nuts yielded at the rate of 3,340 lb. of nuts per acre and small Japanese nuts at 2,516 lb. per acre. An experiment to ascertain the best quality of seed to use for sowing was partially spoiled by "ticca" disease, but it would appear that 60 lb. per acre is sufficient for spreading varieties, and 80 lb. for others.—*Imperial Institute Bulletin.*

SEWAGE-SICK SOILS.

The Gardeners' Chronicle for November states that an investigation by Messrs. Russell and Golding (*Journal of Agricultural Science*, October, 1912) into the sickness of the sewage soils has led the authors to the conclusion that the causes which produce this state are, in the main, identical with those which bring about sickness in ordinary soils.

As the result of previous investigations by Russell and Hutchinson it is suggested that even in an ordinary soil the community of soil micro-organisms is not working at its maximum efficiency as measured by the rate at which plant food is being produced.

If such imperfectly efficient soils be partially sterilised, the crops taken on them are larger than those obtained from untreated soil. Hence the agent which is lowering the fertility of the soil is a vital agent. Various considerations point to the unicellular animals (protozoa) of the soil as the cause of reduced fertility and it is suggested that in ordinary soils these animals prey upon soil bacteria, reduce their numbers, and hence their activity in producing nitrogenous plant food.

By partial sterilisation, the protozoa are killed, but certain of the bacteria are not. Free from their hereditary foes the surviving bacteria increase, multiply and manufacture more vigorously than in either normal or sick soils.

The essential conclusion reached by Russell and Golding with respect to sewage-sick soils is similar to that just outlined. Such soils will stand no more sewage. If further additions be made the material fails to percolate through the soil, crops are injured and even killed. Partial sterilisation of the soil restores its "health."

Hence, if a practical method can be devised whereby sick soil may be sterilised partially and cheaply, a definite advance will have been made in the problem of sewage treatment; for the sewage farm may then serve for an indefinite period for the successful cultivation of crops.

POTATO-DRYING IN GERMANY.

Germany's total potato crop in 1908 amounted to 915,000,000 cwt., of these 256,000,000 cwt. were used for human consumption, 79,000,000 cwt. for starch and alcohol production, 108,000,000 cwt. for seed, and 374,000,000 cwt. for feeding animals, leaving a surplus of 98,000,000 cwt., valued at £6,000,000. This surplus is largely converted into dried potatoes. According to the *Journal of the Board of Agriculture, U.K.* (1912, 18, 1048) there were 257 potato-drying factories in Germany in 1910 producing either dried slices or dried flakes. In eight factories peeled potatoes form the raw material, in the remainder the unskinned potato is employed. The production for the year amounted to 1,723,000 cwt. of dried material. Feeding trials have shown that dried potatoes form an excellent feeding-stuff for all kinds of stock. The price of potato flakes is stated to be about 7*s.* to 8*s.* per cwt.—*Imperial Institute Bulletin.*

SOME SUGAR STATISTICS.

Messrs. Willet and Gray's Statistical, under date of October 24, gives some very interesting data and statistical compilations concerning the prospective sugar crops of the world, says the *Louisiana Planter and Sugar Manufacturer*. They indicate that the new cane and beet sugar crops will exceed the crops of last year by more than 2,600,000 tons. They estimate the coming beet sugar crop of Europe at 8,935,000 long tons and that of the United States at 625,000 long tons, while they estimate the total sugar crops of the world at 181-2 millions of tons being more than 21-2 millions greater than last year.

It will be remembered that Germany alone fell nearly two million tons short last year of its previous crop because of the great drought in Europe and its injurious effect on the beet crop. But for that short crop the crop of this year would be practically a repetition of the past, so far as quantity is concerned.

For several years the total cane sugar crops of the world have surpassed the total beet sugar crops. This was especially the case last year because of the shortage in Europe, the result of the drought. whereas this season they are expecting the beet sugar crops of the world to slightly exceed the cane sugar product. In the total estimates as against the Cuban crop of 1,896,000 long tons, now closing, they increase the quantity to over 2,000,000 tons and estimate the crop that will begin coming off within the next sixty days at 2,100,000 tons. A notable item is their estimate of the Louisiana cane sugar crop, which resulted in 316,000 long tons last year, this year because of the generally bad season and especially because of the great overflows it is now placed down at 200,000 long tons. Porto Rico, which reached 320,000 tons last year, is put down this season for slightly less while the Hawaiian Islands about hold their own. The Philippines rated at 160,000 long tons last year, are rated for the coming crop at 200,000 tons. Java is placed at 1,300.000 long tons against 1,395,000 long tons, last year. Spain produces about 20,000 long tons of cane sugar this production being comparatively constant from year to year. The world promises to have a full sugar supply but the consumption of sugar is increasing with such great rapidity that we believe it will all be needed and that no special accumulation will result.

SOY BEANS.

Attempts have been made by the Harbin Chamber of Commerce to ascertain the cost of production of soy beans in Manchuria, and it is roughly estimated at 31s. per ton, the price of the beans delivered at the nearest station on the Chinese Eastern Railway, in November 1911, being £4 (approx.) per ton. (*Indian Trade Journal*, 1912, 25, 141). Experiments made with this crop during recent years in Argentina have been so successful that it is the intention of planters to grow the crop on a commercial scale in prefernce to linseed as a restorative crop in rotation with wheat (*India Trade Journal*, 1912, 25, 48).

THE WORK OF THE IMPERIAL INSTITUTE FOR 1911.

The report of Prof. Wyndham Dunstan, Director of the Imperial Institute, for the year 1911, is chiefly occupied with a summary of investigations made by the Scientific and Technical Department.

The work of the Institute may be said to be carried on under four principal divisions :—(1) The Colonial and Indian collections. (2) The Research work laboratories. (3) The Reference Library, and (4) The Bulletin of the Institute.

A course of instruction in tropical agriculture is now provided for candidates selected by the Colonial Office for administrative appointments in the African colonies.

The Court devoted to Ceylon products has recently been extended and improved and a large number of important exhibits have been supplied by the local Government, so that it is now a most satisfactory representation of the present position and resources of the Island. At the instance of the Government and the Planters' Association a pavilion or Rest House is being erected as an annexé to the Court.

Under the head of Fibres a series of samples of cotton forwarded by the Ceylon Agricultural Society are reported on. The remarks on Mitaffi, Caravonica and Cambodia specimens are encouraging. Sun hemp from the Northern Province was valued at £19·10 to £20 per ton (January, 1911).

Under Rubber, reference is made to specimens of Para rubber received from Heneratgoda in which the percentage of caoutchouc was found to be uniformly high, ranging from 95·4 to 96·7 in the dry material: while those from Gangaruwa gave 92·7 and 94 per cent. A sample of *Manihot dichotoma* rubber (probably from Maha-iluppalama) was found of very fair quality though rather deficient in strength.

Reference is also made to Me oil (*Bassia longifolia*) from the Central Province and to tobacco grown at Jaffna and near Anuradhapura. Tuxillo Coca leaves from Ampitiya near Kandy were valued at 8*d.* per lb.

The work of the Institute in developing the resources of the British Colonies is of the utmost importance to the Empire, and we would here take the opportunity of stating that the Society will gladly undertake to forward specimens of tropical products to the Imperial Institute whether sent for exhibition in the Ceylon Courts or for purposes of investigation.

MAIZE IN AUSTRALIA.

The *Agricultural Gazette of New South Wales* (1911, 12, 1034) contains an article on maize growing in New South Wales. It is stated that in Australia the importance of the crop, and the uses to which it may be put, have not yet been realised. Australia in 1909-10 produced 9,000,000 bushels of maize, of which New South Wales contributed 7,000,000 which is used solely as a feeding-stuff for horses. In the same year the United States produced 2,668,651,000 bushels, or 77 per cent. of the world's crop, one of the chief uses of the grain in that country being to feed cattle and swine.—*Imperial Institute Bulletin.*

VETERINARY TOXICOLOGY.

This is the title of an exhaustive treatise on the subject of poisons met with in Veterinary practice, a welcome and valuable addition to the literature of Agricultural and Veterinary Science. The author is G D. Lander. D. Sc. professor of Chemistry and Toxicology in the Royal Veterinary College, London (Publishers Bailliers, Tindall and Cox, Price 7/6).

The first part of the book is taken up with the Chemistry and action of poisions, diagnosis, treatment, &c. The author then goes on to consider the Mineral or Inorganic poisons of which arsenic is the type, organic poisons of which Hydroganic Acid and Stychemic are examples, and last by poisonous plants which are classifield according to botanical orders. The final chapter treats of chemical Toxicology. We should have wished to see a chapter or two specially devoted to tropical pcisonons plants. We do not mean to say that anything like an exhaustive examination has been made of their toxic properties and action but their botanical identity has been well established and something is known of their poisonous character. The author himself expresses the hope that "the labours of Tropical Disease and Agricultural Institutes—such as that of Ceylon—will no doubt slowly unfold a wide field of knowledge."

Some of the plants mentioned in the book are familiar to tropical residents, *e.g.*—Croton tiglium, Jatropha curcas, Verbascum Thapsus, Datura Stamonium, Cerbera odellam, Verium oleander, Azadirachta Indica.

As a work of reference the book should prove of great service to Veterinary practitioners.

ROTATION OF CROPS IN JAFFNA.

Mr. V. M. Muttukumaru, writing from Jaffna on the rotation of crops, says that the rotation of crops as carried on in Jaffna is quite unlike that followed in other countries. Here, different crops are raised, one after the other during the same year, in the following manner :—

In Garden Lands.

December-March	...	...	Tobacco.
April-July	...	...	Samai, a cereal crop.
August-October	...	...	Kurakkan, a cereal crop.
	or		
March-October	...	...	Chillies or manioca

In Paddy Lands.

August-October	...	...	Paddy
February-August	...	...	Tobacco, chillies, onions, gingelly, peas, kurakkan or hemp.

From the above tabular statement it will be evident that the arable lands in Jaffna are under cultivation all round the year and that even under such circumstances the soil does not fail to give adequate returns to the cultivators.

THE COTTON CONGRESS IN EGYPT.

SPINNERS' AND GROWERS' VIEWS.

The Cotton Spinners' final conference was held at the Egyptian University on Friday night, says *The Times* of November 11th. Sir Charles Macara presided over the meeting which lasted until a late hour. Abaza Bey delivered a lecture on cotton cultivation and mixture on plantations.

Afterwards a most interesting debate took place on the policy to be pursued in regard to growers' and spinners' requirements. The spinners disapproved of the creation of new varieties of cotton and demanded a continuance of the production of existing varieties except Affifi, and the concentration of attention on obtaining regularity of quality and length of staple. They recommended that ginning should be longer after picking as the staple matures insufficiently under the present system, and strongly condemned the custom of damping during ginning.

Answering the growers' appeal for higher prices, the delegates contended that prices already were too high and recommended that since present values appear to be an insufficient recompense, the grower should be encouraged to devise scientific or other means to increase the yield per feddan.

INTENSIVE POULTRY FARMING.

The intensive cultivation of hens is about to be taken up in England on a great scale. In America which provides the model for the largest of these ventures, 4,500 birds are called a unit and are "cultivated" on as little as twelve acres. Each of these units consists of three houses in which 1,500 birds are kept. Single comb white Leghorns are the favourite birds; and in recent experiment they yielded the extraordinary average of 146 eggs per bird within the year, or 2,190,000 eggs to 15,000 birds.

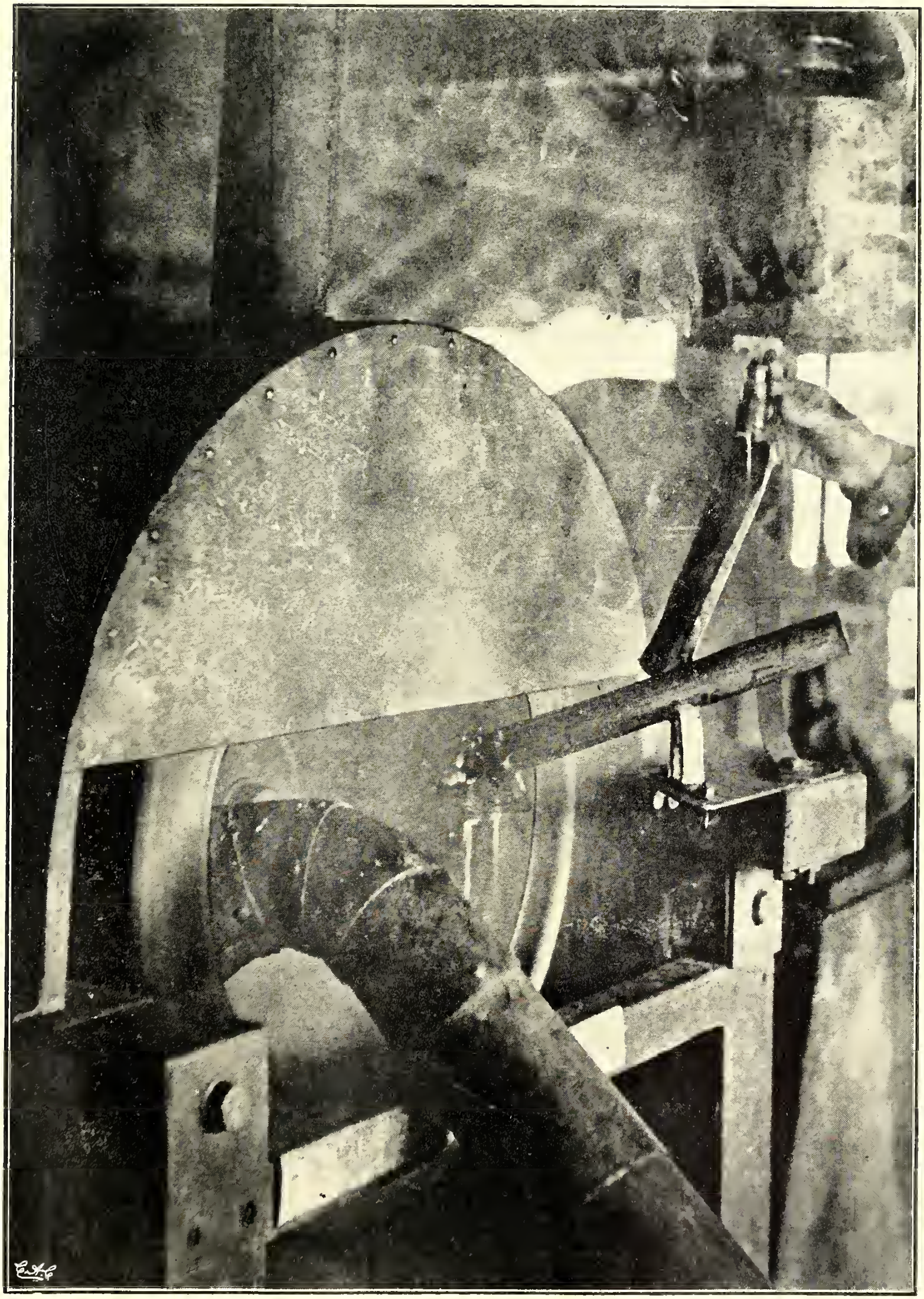
A very considerable farm is being taken on the Wiltshire Downs in order to try the system, the hens being at first imported from the American farm. The houses are simple and cheap, being only 7 ft. high in front and 5 ft. at the back. Occasional "half-way partitions" of the sort seen in some school dormitories are fixed at intervals and this is almost the only extra equipment.

One of the prime advantages of this new intensive system is that it can be worked on a small scale in a town garden or on the vast scale practised in New Jersey with such remarkable results. Plenty of light, plenty of straw and the rejection for laying purposes of all hens ten months after they have first begun to lay—these are given as the prime necessities of the system.—*Daily Mail.*

THE WICKHAM SMOKER.

(*Illustration.*)

We give an illustration of the disc cylinder, smoke flue and feeding tank of Mr. Wickham's smoker B Model for curing hard Para now at work at Peradeniya. The latex can be seen flowing into the cylinder which, revolving, carries it round for contact with the hot smoke issuing from the flue.



MR. WICKHAM'S B. MODEL SMOKE CURE APPARATUS AT WORK AT PERADENIYA.

SILK CULTURE.

CASTOR AS A BY-PRODUCT IN SERICULTURE.

A large quantity of castor oil and cake is imported into Ceylon and the demand for castor cake as a manurial agent is yearly increasing. The castor plant grows wild in almost all the parts of the Island. Would it not be worth while cultivating the plant, if not as a crop by itself at least in connection with the rearing of the eri silk-worm?

The rearing of the eri silk-worm is eminently adapted to be a cottage industry in Ceylon (as in India), and the Silk Farm at Peradeniya which is subsidised by the Ceylon Agricultural Society is making every effort to demonstrate this.

The Imperial Entomologist for India referring to this subject writes:—"The rearing of the eri worm is very simple and can be done on a large or small scale when once it has been seen. The production of thread and cloth offers no difficulty to people accustomed to spinning and weaving cotton and where there is a demand for light remunerative work such as can be done by women and children, and where castor is available. The rearing, spinning and weaving of this silk offer many advantages. The industry is thus capable of wide extension as a minor or home industry where castor grows abundantly. The cultivator can thereby expect to derive an extra income by providing work for his family during recess between agricultural operations and he will be utilising his castor crop for the production of a bye product."

It was in 1905 that sericulture was first taken up by the Ceylon Agricultural Society and the Peradeniya Silk Farm started. The rearing of the eri worm which, owing to the fact that it necessitated no destruction of life as in the case of the mulberry worm, appealed strongly to the school children and a large number of schools took it up at the instance of the Superintendent of School Gardens. With a view to encourage the rearing, the Ceylon Agricultural Society deputed an officer to purchase the cocoons and a large quantity was in this way collected by the Society. But the want of a ready market at the time proved a serious check on the industry. The combination of silk-worm rearing with castor-growing as a double enterprise should prove a remunerative industry for the villager.

At the Pusa College the two are carried on together and it is a matter of surprise to see how little boys are trained to attend to all details from the rearing of the worms to the weaving of cloth.

If castor-cultivation were to be taken up in Ceylon it would not only supply the demand for castor cake and oil but also foster a home industry for women and children in our villages. We give below a statement showing expenditure and income from an acre of castor when grown for seed and silk production. This estimate, which is drawn up by the Imperial Entomologist for India, would have to be slightly modified to suit local conditions:—

Estimate for 1 Acre of Castor.

OUTTURN.

	Rs.
Seed 10 maunds at Rs. 4 per maund	40·00
Cloth 105 yards at Rs. 3 per yard	315·00

COST OF CULTIVATION.

Three ploughings with levelling	3·00
Seed 10 seers	1·00
Sowing	1·00
Two weedings	3·00
Thinning twice	1·00
Topping	·5C
Plucking capsules	1·00
Cleaning seed	2·00
Rent	2·50
Rearing charges: 120 maunds of leaves will give 60 seers of cocoons. 2 maunds leaves producing 1 seer of cocoon at Rs. 25 per maund...	37·50
Spinning charges: 60 seers of cocoons produce 35 seers of thread at Rs. 3 per seer. 1 seer of cocoon produces on an average a little over 9 chattaks of thread	105·00
Weaving charges: 35 seers of thread will produce 105 yards of cloth 52 inches at 4 annas per yard	46·00
Total ...	203·00
Profit ...	152·00
Grand total ...	355·00

N. WICKRAMARATNE.

AMERICAN UPLAND COTTON IN CEYLON.

TRIAL GROUNDS OF THE SEASON.

During the present season about 58 acres in School Gardens and Experimental Plots have been planted up in different parts of the Island with the same variety, viz., Allens' Long Staple American Upland, as shown in the statement given below:—

	No. of plots.	Acres.
North-Western Province...	17	5 1/6
Southern Province ...	13	13
Central Province ...	6	23
Sabaragamuwa Province...	1	2
Uva Province ...	7	8
North-Central Province ...	11	2 1/3
Northern Province ...	2	2 1/6
Eastern Province ...	1	2
Total...	58	57 2/3

The plots are well distributed over the island and useful data will no doubt be obtained.

RUBBER IN THE F.M.S.

TAPPING EXPERIMENTS.

The Agricultural Bulletin of the Federated Malay States contains an account on the above subject by Mr. F. G. Spring:—In April 1905 eight plots of Para Rubber at different elevations were opened up on Gunong Angsi for the purpose of attempting to test the effect of climate conditions on the growth of the tree and afterwards the yield of rubber at different altitudes.

The fields are arranged as follows:—plots 1, 2, 3, 4, 5, 6, 7 and 8 at elevations of 300; 600; 1,000; 1,200; 1,600; 1,800; 2,100 and 2,400 feet respectively. In December, 1911, the average girth of the trees in each plot, with the exception of field 4 which remains unplanted, was taken at a distance of 3 feet from the base of the tree and the girths in the respective plots found to be as follows 25·07; 16·29; 21·83; not planted; 17·86; 16·89; 12·09; and 14·21 inches.

In field (1) which is situated at an elevation of 300 feet the yields of total rubber in experiments 1, 2, 3 and 4 are 555 lbs; 303 lbs; 441 lbs. and and 237 lbs.—a total of 1,536 lbs. While in field (3) at an elevation 1,000 feet the yields of total rubber in experiments 1, 2, 3 and 4 are 388 lbs; 207 lbs; 308 lbs. and 195 lbs.—a total of 1,098 lbs. The increase of rubber obtained in the plot at the lower elevation compared with field (3) is 167 lbs. 96 lbs; 133 lbs. and 42 lbs. in the respective experiments—or a total of 438 lbs.

The increase is no doubt connected with the large girth of the trees in field (1) but indirectly to the trees being at a lower elevation.

To what height Hevea may be grown without a rapid falling off, both in girth and quantity of rubber, is difficult to say; but, judging from the present experiments, an elevation of 1,000 feet is undoubtedly too high to obtain the maximum yield of rubber.

Relative Yields of Rubber.

The next point of interest is the relative yields of rubber from different systems of tapping. It will be seen by referring to the tables that in each experiment both at the first and third clearings, the adjacent quarters (double V) gave a considerably larger yield of total rubber obtained from adjacent quarters compared with opposite, in fields (1) and (3) where two years is allowed for bark renewal, experiments 1 and 3, it is approximately 25·0 per cent. while in the plots where the period of renewal is 4 years, experiments 2 and 4, the excess is approximately 17·0 per cent. Both in adjacent and opposite systems of tapping, where two years is allowed for bark renewal, the amount of total rubber is almost double that obtained from the experiments in which 4 years is allowed for bark renewal, in other words the quantity of latex obtained has been directly dependent on the amount of bark removed.

A notable and interesting feature is that this excess is more evident in the first few months of tapping while at the end of one year the difference is apparently not so great. This falling off of rubber in experiments 1 and 3 is in all probability a sign of exhaustion followed on the severe tapping conducted in these experiments. It will be interesting to see how large the difference becomes as tapping progresses.

The amounts of rubber recorded in the tables are their dry weights.

EXPERIMENT 1.

System of tapping—Double V. cuts 18 inches apart.

Twenty cuts to the inch. Every day tapping.

Time allowed for bark renewal 2 years.

No. of trees 1st clearing 80, average girth 26·3 inches, elevation 300 feet.

No. of trees 3rd clearing 80, average girth 21·12 inches, elevation 1,000 feet.

EXPERIMENT 2.

System of tapping—Double V, cuts 18 inches apart.

Twenty cuts to the inch. Alternate day tapping.

Time allowed for bark renewal, 4 years.

No. of trees 1st clearing 80, average girth 25·6 inches, elevation 300 feet.

No. of trees 3rd clearing 80, average girth 21·4 inches, elevation 1,000 feet.

	Experiment 1.				Experiment 2.			
	1st clearing.		3rd clearing.		1st clearing		3rd clearing.	
	lbs.	ozs.	lbs.	ozs.	lbs.	ozs.	lbs.	ozs.
Total ...	484	13	340	2	265	11	172	4
Total Scrap & Bark Shaving...	70	14	48	12	38	2	35	8
Total Rubber ...	355	11	388	14	303	13	207	12

EXPERIMENT 3.

System of tapping—opposite quarters. Two cuts of 18 inches apart on each quarter.

Twenty cuts to the inch. Every day tapping.

Time allowed for bark renewal 2 years.

No. of trees 1st clearing 80, average girth 25·1 inches, elevation 300 feet.

No. of trees 3rd clearing 80, average girth 21·6 inches, elevation 1,000 feet.

EXPERIMENT 4.

System of tapping—opposite quarters. Two cuts of 18 inches apart on each quarter.

Twenty cuts to the inch. Alternate day tapping.

Time allowed for bark renewal 4 years.

No. of trees 1st clearing 80, average girth 25·8 inches, elevation 300 feet.

No. of trees 3rd clearing 80. average girth 21·7 inches, elevation 1,000 feet.

	Experiment 3.				Experiment 4.			
	1st clearing.		3rd clearing.		1st clearing.		3rd clearing	
	lbs.	ozs.	lbs.	ozs.	lbs.	ozs.	lbs.	ozs.
Total ...	384	10	262	5	187	10	162	8
Total Scrap & Bark Shaving...	57	4	46	10	49	10	32	14
Total Rubber ...	441	14	308	15	237	4	195	6

	Elevation	Expt. 1. Rubber T.		Expt. 2. Rubber T.		Expt. 3. Rubber T.		Expt. 4. Rubber T.		Grand Total.	
		lbs.	ozs.	lbs.	ozs.	lbs.	ozs.	lbs.	ozs.	lbs.	ozs.
1st Clearing ...	300 ft.	555	11	303	13	441	14	237	4	1,538	10
3rd Clearing ...	1,000 ft.	388	14	207	12	308	15	195	6	,100	15

COCONUTS IN MALAYA.

IMPORTANT POINTS AFFECTING THE INDUSTRY.

We cull the following from the *Indian Agriculturist* of November 1912:—In his report for 1911 the Director of Agriculture, F.M.S., says the questions connected with coconut cultivation have not received the attention they desereve in the Federated Malay States. There has been too much of the idea that a coconut only has to be planted somewhere near the sea and it will grow anyhow. As a matter of fact, the coconut probably requires even more careful attention than Para rubber trees. One point is clear and that is that conditions in Malaya are quite different from those obtaining in other countries; for example, the best plantations here are those on heavy clay land while the usual idea is that coconuts thrive best in light soils. The majority of plantations here are on the flat low-lying lands near the coast.

Drainage an Important Factor.

It is evident that on such soils drainage is a most important factor and the possibilities of this should be especially looked into when the location of a proposed plantation is being selected. The main drains at least should be put in before any planting is done. A coconut is very intolerant of stagnant water and some of the native holdings suffer considerably through inattention to this point.

The question of the cultivation of coconuts is still an open one. Does clean weeding as commonly practised on rubber estates, pay best? Is it better to keep clean an eight-foot circle round the trees and allow the weeds to grow (always excluding lalang) or should the intermediate land be ploughed or forked? Should a leguminous cover crop be grown? Is any manurial treatment required beyond an occasional dressing of bullock manure? I would not wish to pronounce on any of these points though from what I have seen I would say that clean weeding is not so great a success with coconuts as it has been with rubber. The experiments that are being carried out by Mr. W. R. Munro, of Permatang Estate, Jugra, on these lines will be watched with much interest, and it is to be hoped that other planters will make similar tests for themselves.

COAGULATION OF FUNTUMIA.

BY THE WICKHAM PROCESS AT PERADENIYA.

It is well known that considerable difficulty has been experienced in the coagulation of the latex of *Funtumia elastica*. The biscuit exhibited by the Department of Agriculture at the All-Ceylon Exhibition took three weeks to coagulate. At the beginning of this month 3 lbs. of latex from the Peradeniya trees was put through the Wickham B model smoker. It coagulated in an hour and a half, a block of 5½ oz. of rubber being obtained therefrom. The rubber took longer to form than is the case with Para which coagulates almost immediately on contact with the hot smoke.

RICE AND COTTON IN THE PHILIPPINES.

In his Annual Report for 1911-12 the Director of Agriculture in dealing with the subject of rice cultivation of the Philippine Islands, says that as rice is the crop upon which the great majority of the people of these ands depend for sustaining life, it was thought that the greatest good to the greater number could be accomplished by trying to improve this crop first. Up to the opening of the last planting season nine hundred and ten varieties, native to these Islands, had been collected. Of this number four hundred and fifty-two were found to be lowland, or transplanted rice, the remainder upland. The lowland varieties were planted at Alabang, Rizal Province, on a stiff clay soil which had been used for rice culture for many years. The same varieties were planted also at San Miguel, Tarlac, on a rather new dark sandy soil. Irrigation water was available in both cases.

In testing these varieties much time was spent taking notes on each variety in order that comparison may be made with its behaviour under different conditions and in subsequent years, and also in order to be able to identify varieties and eliminate duplicates. Observations were made under eighty-eight different headings for each variety covering the entire history of the plant from sowing to harvest and every part of the plant which may be found to vary. This information is necessary in making a close study of the varieties.

The upland varieties were planted on the same land as last year except that this land had been grown in velvet beans during the dry season which left it in good condition for the succeeding crop of rice. The yields, however, were not up to the year before mainly on account of the fact that the rains were not as frequent as the year before. One very peculiar fact was noticeable in regard to the crop; while the rainfall was less than the year before, particularly near the harvest time, the varieties took three to twelve days longer to mature than they did the previous year.

Cotton Investigations.

Dealing with the question of cotton the same report says that one of the principle lines of the activity of the fibre office during the fiscal year 1913 will be to carry on an extensive line of experiment work in cotton. These will include native species and types of cotton as well as others imported from the United States and Egypt.

A systematic study and investigation work in cotton has not yet been made; but from the preliminary trials made during the past year certain native types of cotton were found to exhibit such encouraging results that it was deemed not only advisable but also necessary, that a more detailed and more systematic investigation be carried on.

Through the co-operation of the demonstration and extension division, the division has been able to secure samples of lint and seed from the principle native species of cotton in Panay and Cebu, and also tentative descriptions and information about these species. The sample of seed and lint of the above mentioned and other species secured by the fibre expert have been sent to the United States Department of Agriculture at their request. Their tests and experiments, combined with the results which we hope to arrive at here, promise very interesting and important information about the cotton industry in general.

The object of the cotton investigation is to encourage the production of this crop in sufficient quantities to supply the local demand for raw cotton and yarn, and for the local manufacture of cheap cotton goods. The larger part of the importations of the first two classes and a large part of the third come from China and other eastern countries.

IS THE EARTH SHRINKING?

The following letter appears in *Nature* of November 21st, 1912 :—I have carefully looked at this question from every point of view which presented itself to me, and doubt very much whether any direct evidence will ever be forthcoming on this subject, unless it should one day be established that the changes of magnetic declination are associated with a slight difference of rotation between the core of the earth and its crust, for such a movement would have to be explained by a difference of rate of contraction between the two.

The foldings and crackings of the earth's surface have been attributed to variations in the rate of cooling of the earth. Thus, whenever this rate is accelerated, the surface cools faster than the core and should crack like a drying ball of clay; whenever the cooling rate is diminished, as assumed by Lord Kelvin, the core should shrink faster than the skin, like a drying apple, and folding should occur. But to my mind, as recently explained in "Unity in Nature," such effects would be entirely masked by such foldings and crackings as are slowly progressing even today, for the sediment which is being constantly deposited on the floors of the oceans must cause the underlying strata to grow warmer and to expand in every direction, resulting in slight local risings, which are most marked near the mouths of large rivers, and in distinct bulgings and foldings of the weakest lines of the earth's crust, which are the mountain ranges. On the other hand, the gradual wearing away of the surfaces of the continents and mountain ranges, must cause the underlying strata to cool, to shrink and to crack. The suggestion would certainly more than account for all the foldings, faults and cracks to be found in the earth's crust, even if a considerable allowance be made for those cases in which the expansions and contractions occur in the same direction, and partly balance each other.

C. E. STROMEYER.

"Lancefield," West Didbury,
November 7, 1912.

PARA SEED SUPPLY.

According to *Tropical Life* (1912, 8, 72), it is estimated that on certain estates Hevea trees in full bearing will produce about 8 tons of nuts per 100 acres, or assuming 200 trees per acre, under 1 lb. per tree. The same journal continues that on this estimate the 40,000,000 rubber trees stated to exist in Malaya alone should yield 18,000 to 20,000 tons of seeds per annum, whilst supplies from Ceylon and elsewhere should amount to a further quantity of 40,000 tons and that planters will eventually find it advantageous to utilise the seed, especially as the increased production of rubber is likely to lower its market value.—*Imperial Institute Bulletin.*

SOME USES FOR SUGAR.

The *Bulletin Agricole* of Mauritius for April, 1912, gives a summary in an interesting manner of the many ways that sugar is used in addition to its consumption as food and flavouring, the information being based on an article by M. A. Vivien, a well-known French chemical engineer. On the larger scale it is employed in tanning, particularly in connection with the use of chromic acid for preparing skins, for dyeing, the silver-plating of glass, textile manufactures and is even mixed with motar and cement. Other large consumptions of sugar are concerned with the making of explosives, blacking, transparent soap, clear coconut oil, white linens and the regulation of the rate of emission of acetylene gas. In America it is mixed with coke, in the manufacture of briquettes and similar materials. By burning it in a closed vessel a form of carbon is obtained which is useful for making electric arc 'carbons.' Sugar also enters into the composition of many copying inks and gums. Lastly, one of its chief means of consumption is in medicines.

It is claimed that sugar heated on a metal plate yields 6 per cent. of formaldehyde and appears to justify the old method of disinfecting a room by burning sugar.

The power of sugar as a preserving agent is well-known, and greater use of this may be made, particularly for keeping fresh meat and fish; a patent has actually been granted in which a solution of sugar containing formalin or creolin is employed for preserving eggs. In another way, cut flowers may be made to keep fresh for a longer time by placing their stalks in water containing 5 to 20 per cent. of sugar : for roses the strength is 7 to 10 per cent; for chrysanthemums it is 15 to 17 per cent. There are flowers, however, such as lilies, pelargoniums and sweet peas which fade more quickly in water containing sugar.

The antiseptic properties of sugar are employed in wood preservation by such means as the Powell wood process and it enters into many preparations intended for preventing the ravages of fungi. Boilers and other steam-producing apparatus are kept from 'scaling' by the use of preparations containing sugar. Various useful organic acids are made with the aid of that substance, and in the course of the preparation of some of them gases possessing a high calorific value (heating power) are produced; it is also employed in preparing such acids by fermentation : among them are butyric acid, yielding butyric ether which has the smell of pineapples and is used largely in the perfumery trade and in making syrups.—*The Agricultural News.*

AGRICULTURAL AND INDUSTRIAL SHOW.

The sixth Kistna Agricultural and Industrial Show will be held at Ellore on the 22nd, 23rd and 24th February 1913. Exhibits are invited from all parts of India, Burma and Ceylon. Intending exhibitors should apply to the Honorary Secretary, Show Committee, Ellore, Kistna District.

THE UNIVERSITY OF BRISTOL AND AGRICULTURE.

The University of Bristol, the youngest of our universities, has made it evident that it intends to play an active part in the development of agricultural education and research, says *Nature* of November, 1912. Some two years ago the University associated itself with the Royal Agricultural College, Cirencester, for purposes of higher education in agriculture, and arrangements for the granting of degrees in that subject are now being completed.

The Board of Agriculture and Fisheries has recently notified its intention of making an annual grant of £500 to the college to enable it to provide for research on questions relating to forestry for the west of England area.

The University has also recently associated with itself the National Fruit and Cider Institute, which was established at Long Ashton, near Bristol, in 1903, to carry on investigations on fruit culture and cider-making. This institution has been supported since its establishment by annual grants from the Board of Agriculture and Fisheries, the County Councils of Devon, Gloucester, Hereford, Monmouth, Somerset and Worcester, and the Bath and West of England Agricultural Society. Its association with the University is the result of an offer on the part of the Board of Agriculture and Fisheries to the latter of an annual grant approximating to £2,500 to provide for the establishment of one of the agricultural research institutions contemplated by the Board in connection with the grant from the Development Fund available for the promotion of agicultural research.

The special subject of research allotted to Bristol is that of fruit-growing, including the practical treatment of plant diseases. The offer of the Board was conditional on the National Fruit and Cider Institute being made the centre at which the work was to be carried on. In connection with the scheme a capital expenditure of £10,000 has been estimated to be necessary. Of this sum the Development Commissioners intimated their willingness to provide 50 per cent., provided that the remaining half was raised locally. Largely owing to the efforts of the Rt. Hon. Henry Hobhouse, Chairman of the Somerset County Council, the necessary money has been subscribed. The expenditure is required for the purchase of land and the erection and equipment of laboratories and other buildings at Long Ashton. A department of agricultural and horticultural research has thus been created, Mr. B. T. P. Barker, Director of the National Fruit and Cider Institute, being appointed head of the department and Professor of Agricultural Biology in the University. Towards the upkeep of the department the University is contributing an annual sum of £300, the income of a gift from the late Lord Winterstoke for the purpose of agricultural research; and the income from other sources, including County Council grants, is about £1,500.

The department of chemistry in the Unversity is also taking part in the work. In the biochemical laboratory, investigations on the tannins of cider are proceeding in connection with the fruit research work. A special grant from the Development Fund for the continuation of investig-

ations on the chemistry of Cheddar cheese, which have been carried out during the past two years by Dr. Nierenstein, has been promised. This work was begun in the first place at the request of the Somerset County Council, a grant for the purpose being given by that body.

The Board of Agriculture and Fisheries also proposes to make the University the centre for a group of the western counties in connection with its scheme for the provision of technical advice to farmers. The group will probably include Gloucester, Hereford, Somerset, Wiltshire and Worcester, and possibly one or two other adjoining counties for special purposes. An annual sum of £1,000 is provided by the Board for this work. Under this scheme investigations on problems of local agricultural importance will be undertaken.

THE ORIGIN OF DRY FARMING.

The following is a translation of some comments on Dr. J. A. Widstoe's "Dry Farming," published in the *Bulletin Agricole de l' Algerie et de la Tunisie,* under the heading "Dry Farming in Algeria and Tunis," by F. Couston :—

Just one word on the paragraph referring to Jethro Tull in the chapter dealing with the history of Dry Farming.

It is a curious fact that 200 years ago this English agriculturist devised a system of cultivation for application in his own country based on the Bourdiol method of cultivation, exactly as it is recommended to-day for our dry climate.

The first idea of his method came to him, says Widstoe, during a journey which he made to Languedoc in France. It was there that he learned the necessity for continuous working of the soil.

Our own master, Deherain, loved to relate the following anecdote in his advice to us on the good effects of repeatedly working over the surface :—

Travelling also in Languedoc, he came across an old vigneron one day in the middle of August who was occupied in digging over his vineyard again with great care although the soil there was perfectly loose and free from weeds. Puzzled to know the reason for the laborious toil which the old man had imposed on himself, and which appeared at least useless and unnecessary, he asked him in that tone of conviction which comes from long experience; the vigneron answered: "It always makes the grapes grow a little bigger."

In spite of its Anglo-Saxon appearance, Dry Farming has come, directly from the genius of the French.—*Agricultural Gazette of N. S. W.*, November 2, 1912.

TOBACCO.

KINGDOM OF HUNGARY.—With regard to yield, the tobacco harvest has been very abundant, but it leaves much to be desired as to quality owing to the damp weather which hampered the drying of the leaves.

CANADA.—From 50 to 75 per cent. of the tobacco plants suffered in Quebec and Ontario owing to the cold and wet weather. The quality of the crop in Quebec is low, being very inferior to the average, and in Ontario the yield is about half of the average.—*Bulletin of Agricultural Statistics.*

THE BROOM CORN FIBRE INDUSTRY.

Applications have reached us for information regarding the plant whose cultivation forms the basis of this industry which is attaining to large proportions.

Broom Corn is a species of Sorghum which has come to be known among the natives, since its introduction by the late School of Agriculture, as "Idal iringu" which is a literal translation of the English name.

Mr. Temple Smith of the Agricultural Department of Victoria writes an article on this subject in the *Agricultural Journal of that State*, which we summarise for the benefit of those interested in the industry.

The cultivation is suitable to holders of small blocks of land, preferably so where irrigation is possible. It will grow where maize grows, but it is a hardier plant and stands drought better. Sandy loams and alluvial soils are the best, and stiff clays its worst soils.

Sowing is done at the rate of 4 lbs. per acre. The rows should be 3 feet apart and the plants 7 or 8 inches apart in the rows. Until the plants are 6 or 7 feet high the space between the rows should be worked to keep down weeds and preserve the soil in a loose condition.

Sheds for drying should be provided. These may be made of any rough material and should have free ventilatian, so as to allow the moist air within an easy means of escape. The quicker the curing process the better the colour of the fibre, as the green colour (which is desirable) is then fixed.

A crop will be ready in about five months and should be harvested as soon as the seed begins to harden. In the green stage the stalks will be more useful as fodder for stock.

The heads which have been previously "wrung" so that the fibre on them may hang down and straighten are cut off from about 6 inches below the junction of the pannicles with the main stalk, and any sheaths attached to the stalk are rubbed off, the heads being kept straight in the hand with bulbs all one way. These are laid across the cut stalks to keep them from being soiled.

The sooner the fibre is removed to the shed the better. Here it is laid on a flooring of saplings, battens or wire-netting to dry. The layer should not be over 3 inches deep. In dry weather the fibre will be ready in 6 or 7 days and should be bulked with the heads all one way. Care should be taken not to allow the temperature to rise in the layers.

The seed is usually threshed by means of a roller. After separating the seed, the fibre is graded and made up into bundles about 5 inches in diameter, and is then ready for packing into bales.

The amount of marketable fibre taken off an acre is from 7 to 10 cwt., the value ranging from £20 to £35 per ton. Taking the fibre at 7 cwt. per acre and the average value at £25 a ton, the fibre alone is worth £8-15*s*. while the average value of the seed (3 bags per acre at 7*s* per bag)

is £1-1s. or a total of £9-16s. per acre, not reckoning the value of the stalks as fodder. Where family labour is employed, there should be no difficulty in making a clear profit (on a low estimate) of £5 or £6.

Besides the profit on the fibre a useful fodder will be available. The seed is useful for feeding poultry, pigs, and even horses.

The fibre is utilised for the manufacture of American brooms and whisks, for which there is a large and growing demand. The product will not flourish in hot wet countries, but prefers cool and dry climates.

THE MEXICAN COTTON BOLL-WEEVIL.

The Mexican cotton boll-weevil (*Anthonomus grandis*) has spread so rapidly in the southern States of America during recent years as to become the most serious pest with which cotton-growers have to contend. A detailed report on this insect and its ravages has been published by the Bureau of Entomology, U. S. Department of Agriculture (Bulletin 114), with twenty-two plates and thirty-four text figures. An exhaustive account is given of the investigations carried on since 1895, the chief contents of previous publications on the boll-weevil being incorporated in this important memoir. The area infested by this pest has increased from 1,400 square miles in 1892 to no fewer than 271,000 square miles in 1911, the average rate of spread during the last six years having been 27,000 square miles a year. At present 400,000 square miles of cotton-producing area remain unaffected, but the alarming rate of spread has led to the adoption of energetic measures for the repression of the weevil. The report is largely devoted to elaborate descriptions of the life-history, dissemination and hibernation of the insect. Under the heading "natural control," the compilers describe the effects of temperature and other climatic conditions upon the weevil, the fungus and bacterial diseases (unfortunately very few and sporadic) to which it is subject, and the extent to which it is kept down by parasitic and predatory insect enemies and by birds. Finally, they enumerate the various methods of repression which have been tried; the most successful is that of destroying the weevils in autumn by uprooting and either ploughing-in or burning the cotton plants.—*Nature*, November 21st, 1912

DESTROYING FLIES.

The following article has been contributed by Mr. W. W. Froggatt to the *Agricultural Gazette of N.S.W*:—Blow-flies always go on to the windows, consequently insecticides dusted along the window-sills or on the edge of the windows is very effective if done every few days. The essential oil in the insecticide or Pyrethrum powder kills by contact.

For house-flies, we find a saucer containing 15 parts water (or water and milk in equal parts) and 1 of formalin, in the centre of which is placed a crust of bread sprinkled with sugar, is very attractive to flies. They come to the saucer and die all round it. Measure the proportions of water and formalin with a teaspoon.

When closing up a room or kitchen infested with flies, cover up all food and liquid, place the saucer on the table on a sheet of newspaper or in the brightest place in the room, and the flies will soon die out.

THE CULTIVATION OF LAC IN THE PLAINS OF INDIA.

This is the title of a *Bulletin of the Agricultural Research Institute*, Pusa, of which Mr. C. S. Misera, Chief Assistant to the Imperial Entomologist of India, is author.

Lac has been known in India from very ancient times, and the cultivation of the insect which produces lac (*Tachardia lacca*) on systematic lines has only been taken up of late, and is now spreading to other countries.

There are a large variety of trees—cultivated and uncultivated—on which the lac insect grows. Of these Kusum (Sin. Kon), Ber (Sin. Masan), Palas (Sin. Karanda), Peepul (Sin. Bo), Arhar (Sin. Rata tora) are specially mentioned.

The detailed information furnished by the Bulletin under review supplies a decided want, and those who desire to know all about the lac industry will find the publication most instructive.

The propagation of the insect is done by inoculation of brood lac on to the tender branches of trees. Sticks with emerging insects are tied to the branches, so that both ends touch the latter.

Two crops of lac can be taken in a year, but generally only one crop is taken from each tree. If, however, it is so desired, two crops can be taken from a tree by partial inoculations. Before inoculation, trees should be pruned so that they may produce tender branches at the time of inoculation. This is necessary only at the start as subsequently the removal of the lac crop has practically the same effect as pruning. In the case of Kusum and Palas no pruning is ordinarily required. Kusum gives a crop only in two or three years as the growth of the branches after a crop of lac is taken is very slow. But this is more than counterbalanced by the superior quality and heavy crop of lac obtained.

The method of pruning of trees, and the implements used for the purpose, are clearly explained by means of illustrations.

The crops mature at two seasons, viz., Baisaki, from June-July to September-October, and Kartiki, from October to June-July. The matured lac is gathered by cutting the lac-bearing branches, which are reduced to pieces 8 to 11 inches long and kept on bamboos in a cool airy place. Twelve to fourteen days after removal from the trees the insects will emerge, thus indicating that the time has arrived for inoculation. When all the insects have emerged from the sticks and swarmed on to the branches, the sticks are collected and the lac encrustation may be scraped off and sold, or washed to produce seed-lac. The washing is done by soaking the sticks for twenty-four hours to separate, and the impurities and the red colouring matter, which is called lac-dye, as the value of seed lac for manufacturing shellac and other materials is greatly reduced by the presence of this colouring matter.

Lac is employed for various purposes such as for ornaments, toys, sealing wax, gramophone records, varnishes, lithographic inks, etc,

There are no serious enemies of the lac insect. Ants frequent the trees to gather the honey-dew secreted by the lac insect, and in licking it

they inadvertently detach the whitish hairs which are connected with the respiratory systems in the females and so cause their death. Other enemies are the predaceous caterpillar which feed on lac, and two small parasites which lay eggs in the resin cells of the female and so kill them.

The methods of fighting these enemies present no difficulties and are fully explained in the bulletin.

On the whole the bulletin with numerous illustrations, including a coloured plate, will be found a useful guide to those who take an interest in lac culture.

The following are the botanical names of the trees referred to above :— Kusum (*Schleichera trijuga*), Ber (*Zyzyphus jujuba*), Palas (*Butea frondosa*), Peepul (*Ficus religiosa*), Arhar (*Cajanus indicus*). The omission of the Rain tree (*Pithecolobium saman*) is noticeable.

N. WICKRAMARATNE,
Agricultural Instructor.

PAPER-MAKING IN BURMA.

The Indian Agriculturist of November 1, 1912, states that paper has been made in Burma and the Shan States for a very long time.

The Chinese taught the Japanese how to make paper, as they also taught them how to make porcelain and bronze and all their forms of art, and the Japanese have known how to profit by what they were taught and how to improve on it. Like the Chinese, the Japanese began by making paper from the so-called paper mulberry bush, which botanists know as the *Broussonetia papyrifera* and the Japanese call *kozu* and other plants with hand machines. The Japanese have got far beyond that in places. Just as they have got beyond buying all their rifles and battleships and machinery in Europe they have proved that they can make papers in the same texture as the European mills. The value of the production of the Japanese machine-equipped mills is now £1,600,000 while that of the hand mills still keep a head of it with £1,900,000. It was not till 1872 that the making of paper in the European style began. In that year the Oji paper-mill was established which uses rice, straw, rags and waste-paper for the manufacture.

THE MOON AND THE WEATHER.

Lecturing on "The Moon" at Queen's College, London, Professor R. A. Gregory said investigations had shown that air tides were produced by the moon but they only caused a difference of one-fiftieth of an inch in the height of the mercury in a barometer and were of no value in practical weather-forecasting. Systematic inquiries had failed to reveal any useful rule connecting the moon with the weather.

Meteorologists in many countries had, however, shown that there were more thunderstorms during the first half of a lunar month than at the period of the full and waning moon. But this was of no assistance in predicting the occurrence of individual storms.—*Daily Mail*,

INFLUENCE OF GEOGRAPHICAL CONDITIONS UPON JAPANESE AGRICULTURE.

In a paper read recently before the Royal Geographical Society, Miss E. C. Semple discussed largely on the basis of personal observation a number of interesting features in the influence of geographical conditions upon Japanese agriculture, says *Nature*. Premising that islands, with climates rendered equal by marine influence, and with the further advantage of supplying "the double larder of land and sea," offer specially favourable conditions for the early development of civilisation, she showed that agriculture in such circumstances quickly becomes intensive owing to the demand of an expanding population upon a cultivable area which being insular is not capable of expansion. This condition is particulary marked in Japan, because to its insular character are added other contributing causes. Cultivation and settlement are rare above about 2,300 ft. of elevation. Forests and barren highlands above this height clearly segregate the densely populated valley-settlements, which cling closely to the rivers and streams where rice, the staple crop, may receive the necessary irrigation.

Moreover, it is not merely what may be termed the mechanical facilities for this cultivation which limit its distribution. The generally unfertile character of the soil has also to be taken into account. Miss Semple quoted the present percentage of arable land to the total area of Japan proper as only 14·37, and proceeded to show that so far as statistical data are available, only Finland, Sweden, and Norway show a smaller percentage, and these, unlike Japan, are sparsely populated countries. The reclamation of the unfertile and ill-watered wastes and the diversification of crops are beyond the means of the Japanese small-holder, though a few rich farmers or companies have undertaken such work.

In dealing with the fertilisation of the soil, Miss Semple adverted to "the parctical absence of stock-raising." It has been sought to attribute this peculiar feature to the principles of the Buddhistic faith, but Miss Semple prefers to find its reason in the scarcity of natural pasturage or fodder-plants. She dealt at some length with the two classes of wet and dry fields characteristic of Japanese agriculture, together with the geographical effect of relief upon their distribution ; on the other hand she showed that the terrace system of cultivation usually associated with mountainous tracts alone is not so in Japan, because the irrigation of the low-land rice-fields also involves it. The raising of the silk-worm is found to be practically confined to inland provinces and largely to upland farms, where communications are bad, and the natural tendency has been to develop a product of small bulk (and therefore easily conveyed) and high proportional value.

MARKET RATES FOR TROPICAL PRODUCTS.

(From Lewis & Peat's Monthly Prices Current, London, 6th November, 1912.)

	QUALITY.	QUOTATIONS.
ALOES, Socotrine cwt.	Fair to fine ...	62s 6d a 67s 6d
Zanzibar & Hepatic ,,	Common to good ..	40s a 75s
ARROWROOT (Natal) lb.	Fair to fine ..	8d a 9d
BEES' WAX, cwt.		
Zanzibar Yellow ,,	Slightly drossy to fair ..	£6 17s 6d a £7
East Indian, bleached ,,	Fair to good	£7 17/6 a £8 2/6
,, unbleached ,,	Dark to good genuine ..	£5 17/6 a £6 10s
Madagascar ,,	Dark to good palish	£6 15s a £7 2s 6d
CAMPHOR, Japan ,,	Refined	1s 5¾d a 1s 8d
China ,,	Fair average quality ..	157s 6d
CARDAMOMS, Tuticorin	Good to fine bold	5s 2d a 5s 8d
	Middling lean	4s 6d a 4s 11d
Malabar, Tellicherry	Good to fine bold ..	5s 1d a 5s 7d
Calicut	Brownish .	4s 6d a 4s 11d
Mangalore ,,	Med brown to fair bold	4s 9d a 6s
Ceylon, Mysore ,,	Small fair to fine plump	4s 3d a 6s 2d
Malabar ..	Fair to good ...	3s 9d a 4s
Seeds, E. I. & Ceylon ,,	Fair to good ..	4s 6d a 4s 9d
Ceylon Long Wild ,,	Shelly to good ..	1s 2d a 3s 2d
CASTOR OIL, Calcutta ,,	Good 2nds .	3¾d
CHILLIES, Zanzibar cwt	Dull to fine bright ...	40s a 45s
Japan ,,	Fair bright small ..	30s a 32s 6d
CINCHONA BARK.—lb. Ceylon	Crown, Renewed	3⅜d a 7d
	Org. Stem	2d a 6d
	Red Org. Stem	1¾d a 4¼d
	Renewed	3d a 5¼d
	Root	1⅞d a 4d
CINNAMON, Ceylon 1sts	Good to fine quill	1s 3d a 1s 7d
per lb. 2nds	,, ,,	1s 4d a 1s 6d
3rds	,, ,,	1s a 1s 5d
4ths	,, ,,	1s a 1s 4d
Chips, &c..	Fair to fine bold	2d a 3d
CLOVES, Penang lb.	Dull to fine bright pkd.	1s a 1s 2d
Amboyna ..	Dull to fine	9d a 10d
Ceylon ..	,, ,,	8½d a 9d
Zanzibar	Fair and fine bright	8½d a 8¾d
Stems ..	Fair	2¾d
COFFEE		
Ceylon Plantation cwt.	Medium to bold	Nominal
Native	Good ordinary	Nominal
Liberian ,,	Fair to bold	85s a 90s
COCOA, Ceylon Plant. ,,	Special Marks	77s a 90s
	Red to good	70s a 76s 6d
Native Estate ,,	Ordinary to red	42s a 75s
Java and Celebes ,,	Small to good red	25s a 82s 6d
COLOMBO ROOT ,,	Middling to good	12s a 19s
CROTON SEEDS, sift. cwt.	Dull to fair	70s a 80s
CUBEBS ,, ,,	Ord. stalky to good	150s a 170s
GINGER, Bengal, rough ,,	Fair	35s nom.
Calicut, Cut A ,,	Small to fine bold	78s a 85s
B & C ,,	Small and medium	55s a 75s
Cochin Rough ,,	Common to fine bold	36s a 40s
	Small and D's	35s
Japan ,,	Unsplit	26s
GUM AMMONIACUM ,,	Ord. blocky to fair clean	40s a 72s 6d
ANIMI, Zanzibar	Pale and amber, str. srts	£12 10s a £14 5s
	,, ,, little red	£11 a £12
	Bean and Pea size ditto	75s a £9 10s
	Fair to good red sorts	£7 a £10
	Med. & bold glassy sorts	£5 a £8
Madagascar ,,	Fair to good palish ...	£4 a £8 15s
	,, ,, red ...	£4 a £7 10s
ARABIC E. I. & Aden ,,	Ordinary to good pale	33s a 37s
Turkey sorts ,,		[illegible]8s a 62s 6d
Ghatti ,,	Sorts to fine pale ...	25s a 35s nom.
Kurrachee ,,	Reddish to good pale ...	25s a 30s ,,
Madras ,,	Dark to fine pale ...	25s a 30s ,,
ASSAFŒTIDA ,,	Clean fr. to gd. almonds	£10 a £12
	com. stony to good block	50s a £9
KINO	Fair to fine bright	6d a 1s 5d
MYRRH, Aden sorts cwt	Middling to good	50s a 60s
Somali ,,	,, ,,	47s 6d a 50s
OLIBANUM, drop ,,	Good to fine white	45s a 50s
	Middling to fair	35s a 40s
pickings ,,	Low to good pale	12s 6d a 27s 6d
siftings ,,	Slightly foul to fine	20s a 22s 6d
INDIA RUBBER lb.	Fine Para bis. & sheets	4s
	,, Ceara ,, ,,	3s 9d
Ceylon, Straits, Malay Straits, etc.	Crepe ordinary to fine..	4s 1d a 4s 1½d
	Fine Block ..	4s 3d
	Scrap fair to fine ..	3s 6d a 3s 7d
Assam	Plantation ..	3s 9d
	Fair II to ord. red No. 1	3s a 3s 3d
Rangoon	,, ,, ,,	2s a 2s 10d

	QUALITY.	QUOTATIONS
INDIARUBBER. *(Contd.)*		
Borneo	Common to good	1s 9d a 2s 6d
Java	Good to fine red .	2s 9d a 3s
Penang	Low white to prime red	1s 1d a 2s 2d
Mozambique	Fair to fine red ball ...	3s 6d a 4s
	Sausage, fair to good ..	3s 5d a 3s 11d
Nyassaland	Fair to fine ball ...	3s a [illegible]s 6d
Madagascar	Fr to fine pinky & white	2s 6d a 2s [illegible]d
	Majunga & blk coated ..	1s 1 d a 2s 3d
	Niggers, low to good ..	6d a 2s 9d
New Guinea	Ordinary to fine ball ..	2s 3d a 2s 9d
INDIGO, E.I. Bengal	Shipping mid to gd violet	3s a 3s 6d
	Consuming mid. to gd.	2s 3d a 2s 10d
	Ordinary to middling	2s a 2s 2d
	Mid. to good Kurpah	1s 10d a 2s 5d
	Low to ordinary	1s 6d a 1s 9d
	Mid. to fine Madras	None here
MACE, Bombay & Penang	Pale reddish to fine	2s 6d a 2s 8d
per lb.	Ordinary to fair	2s 2d a 2s 4d
Java	,, ,, good pale	2s 4d a 2s 8d
Bombay	Wild	7d a 8d
MYRABOLANES cwt	UG and Coconada	4s 9d a 5s 6d
Bombay ,,	Jubblepore	4s 10½d a 7s
	Bhimlies	4s 10½d a 7s 3d
	Rhajpore, &c.	4s 6d a 6s
Bengal ,,	Calcutta	4s a 5s
NUTMEGS— lb.	64's to 57's	10d a 1s
Singapore & Penang ,,	80's	7¾d
	110's	5½d
NUTS, ARECA cwt.	Ordinary to fair fresh	14s a 15s
NUX VOMICA, Cochin	Ordinary to good	9s 6d a 12s 6d
per cwt. Bengal	,, ,,	9s
Madras	,, ,,	9s a 9s 6d
OIL OF ANISEED ,,	Fair merchantable	6s 8d
CASSIA ,,	According to analysis	3s 7d a [illegible]s 9d
LEMONGRASS ,,	Good flavour & colour	4d
NUTMEG ,,	Dingy to white	1¼d a 1¾d
CINNAMON ,,	Ordinary to fair sweet	2⅛d a 1s 4d
CITRONELLE ,,	Bright & good flavour	1s 6d
ORCHELLA WEED—cwt		
Ceylon ,,	Fair ..	10s Nom.
Madagascar ,,	Fair ...	10s ,,
PEPPER—(Black) lb.		
Alleppy & Tellicherry	Fair ...	5½d
Ceylon ,, ,,	,, to fine bold heavy ..	5⅝d a 5½d
Singapore ...	Fair	5½d
Acheen & W. C. Penang	Dull to fine	5¼d a 5½d
(White) Singapore ,,	Fair to fine	8¾d a 9d
Siam ,,	Fair	8¾d
Penang ,,	Fair	8d
Muntok ,,	Fair	9¼d
RHUBARB, Shenzi ..	Ordinary to good ...	1s 11d a 3s 3d
Canton ..	Ordinary to good ..	1s 8d a 2s 2d
High Dried..	Fair to fine flat ...	1s a 1s 3d
	Dark to fair round ..	10d a 1s
SAGO, Pearl, large ...	Fair to fine	18s a 19s
medium ..	,, ,,	17s a 18s 6d
small ...	,, ,,	15s a 16s
SEEDLAC cwt.	Ordinary to gd. soluble	55s a 65s
SENNA, Tinnevelly lb.	Good to fine bold green	5d a 8½d
	Fair greenish	3d a 4½d
	Commonspeckyand small	1¼d a 2¾d
SHELLS, M. o'PEARL—		
Egyptian cwt.	Small to bold ...	62s 6d a £10 12/6
Bombay ,,	,, ,, ...	45s a £10 7s 6d
Mergui ,,	,, ,, £	14 5s a £16 17/6
Manilla ,,	Fair to good £	11 10s a £15 15s
Banda ,,	Sorts	95s a 97s 6d
TAMARINDS, Calcutta...	Mid. to fine bl'k not stony	9s a 12s
per cwt. Madras	Stony and inferior ..	4s a 5s
TORTOISESHELL—		
Zanzibar, & Bombay lb.	Small to bold ..	11s a 30s
	Pickings --	13s a 22s
TURMERIC, Bengal cwt.	Fair ..	22s nom
Madras ,,	Finger fair to fine bold [bright	22s a 24s
Do. ,,	Bulbs	18s a 20s
Cochin ,,	Finger fair ..	21s
	Bulbs ...	15s
VANILLOES— lb.		
Mauritius ... 1sts	Gd crystallized 3½ a 8½in	13s a 17s 6d
Madagascar ... 2nds	Foxy & reddish 3½ a ,,	11s 6d a 14s 6d
Seychelles ... 3rds	Lean and inferior ..	11s a 12s
VERMILLION ..	Fine, pure, bright ...	2s 11d
WAX, Japan, squares	Good white hard ...	47s